D1.3/2: 4/8

DEFENSE INDUSTRY BULLETIN

Vol. 4 No. 8

August 1968

UNIVERSITY
AUG 1968

UNIV. LIBS.
DOCUMENTS
DEPARTMENT
U.S. DEPOSITORY

The Pentagon—A Bird's Eye View

IN THIS ISSUE

FEATURES

Foundations for the Future
General James Ferguson, USAF 1

Management Systems Control—A Progress Report
Colonel Albert W. Buesking, USAF 6

Hubbell Report Recommends Change in Military Pay System 10

Navy Plans and Mans for ILS
Rear Admiral N. Sonenshein, USN 14

Prime Contracting Program of Small Business Administration
Clyde Bothmer 18

DEPARTMENTS

Meetings and Symposia 17

Bibliography 21

From the Speakers Rostrum 22

About People 25

Status of Funds Report 27

Selected Defense Department Economic Indicators 37

Defense Procurement 38

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Editor. Telephone queries: (202) OXford 5-2709.

The *Bulletin* is distributed without charge each month to representatives of industry and agencies of the Department of Defense, Army, Navy and Air Force. Subscription requests should be made in writing on letterhead and addressed to the Business & Labor Division, OASD(PA), Room 1E764, The Pentagon, Washington, D.C. 20301.

Contents of the magazine may be reprinted freely without requesting permission. Mention of the source will be appreciated.

DEFENSE INDUSTRY
BULLETIN

Published by the
Department of Defense

Hon. Clark M. Clifford
Secretary of Defense
Hon. Paul H. Nitze
Deputy Secretary of Defense
Hon. Phil G. Goulding
Assistant Secretary of Defense
(Public Affairs)
Col. George F. Hamel, USA
Director for Community Relations
Capt. John A. Davenport, USN
Chief, Business & Labor Division

Editor
LCdr. E. W. Bradford, USN
Associate Editors
Mrs. Cecilia Pollok McCormick
Capt. Frank W. Kafer, USAF
Mr. Rick La Falce
Art Director
Mr. John E. Fagan
Editorial Assistant
Norman E. Worra, JOC, USN

About the Cover

The Pentagon as seen by Chief Photographer's Mate Richard R. Stover's "fish eye" lens from 500 feet in a U.S. Army H-21 helicopter.

Foundations for the Future

General James Ferguson, USAF

We pride ourselves in this country on our technical leadership, our production competence, and our problem-solving capacity. We have lived so long in technical and scientific affluence that we believe anything is possible by pushing a button, or by building the button for someone to push.

Nevertheless, I am concerned today about our "foundations for the future." I refer to those large, complex, and often costly aerospace test facilities which form the base for technological incubation and progress in this country. Among these are our vast test ranges with their instrumentation, our various scientific laboratories, environmental chambers and wind tunnels, and the launch and test stands for our missile and space programs.

These are national resources in the sense that they serve national interests, are shared by all agencies of the Government and our industry associates, and are of such cost and complexity as to prohibit duplication.

Further, they represent capital investments, directly or indirectly, on the part of the Government—similar to the kinds of long-range investments which industry must make from time to time in plants and equipment to assure continued ability to operate profitably and compete effectively.

I am concerned about these national resources for four reasons:

- First, industry and the Air Force Systems Command (AFSC) are jointly and professionally conscious of the need for preparedness, military and industrial. Advanced research and test facilities are long lead-time items essential to our future preparedness posture.
- Second, until recently the facilities built 15 to 20 years ago have been adequate, with modifications and additions, to meet our needs. Now, with the advent of the jumbo jets, the supersonic transport (SST), advanced manned space missions, and the possibilities of travel in the hypersonic flight regime, we are stretching present-day facilities to a thin point and reaching a limit in our ability to "make do" on a year-to-year basis.
- Third, there is clear evidence that the Soviets are emphasizing progressive research, test and technical facilities, and that they are taking some giant steps in these directions. We have learned in recent years some harsh, but perhaps enlightening, lessons on the costs and consequences of allowing reaction or inaction to displace action as the moving force in the timing of national ventures. The United States did not test the first ballistic missile or launch the world's first satellite. The first SST to fly will, in all probability, not be stamped "Made in America." Without the assurance of adequate and ample test facilities for the future, the initial applications of other new technologies may likewise escape us.

General James Ferguson, USAF, is Commander, Air Force Systems Command (AFSC), Andrews AFB, Md., and Director of the Manned Orbiting Laboratory program. In previous assignments he was Deputy Chief of Staff for Research and Development, USAF, and before that Vice Commander, Air Research and Development Command (later designated AFSC).

- Fourth, there is no imaginative, comprehensive, long-range plan for the design, development and acquisition of those facilities which will be needed to provide the critical simulation environments, dimensions, and time durations for future system testing. I feel that such a plan is needed, just as surely as such facilities will be needed.

It must be a plan, national in scope, formulated jointly by all who are responsible for preparedness through resourcefulness.

Recently, the Aeronautics Panel of the National Aeronautics and Astronautics Coordinating Board was asked to formulate an integrated aeronautical facilities program which will support facilities development in that important area.

But, it is appropriate that we in AFSC and industry should also ponder this problem together. Our objectives in AFSC are to sharpen our advocacy of new programs and capabilities, to work toward improved responsiveness to our country's military needs, to stay within forecast dollars for on-going and approved programs, and to strengthen our ability to conduct future research and development projects more cost-effectively. These are goals we can meet or undertake only by working more closely with our partners in industry.

Test Facility Must Precede Technology

I am sure that some of the causes for concern which I feel will also be recognized by industry as challenges to our national well-being.

In the first place, large aerospace test facilities and their "furnishings" are hardly mass-production items. A highly advanced, precision test facility may take three to five years to design and develop, and possibly another two or three years to construct. For planning purposes, we must add the time required for budget justifications and approval, and for funding under military construction appropriations. I'll have more to say about this a little later.

The point is that the kinds of facilities we are talking about must "pace" the state of the art. They must be well "ahead of their time" with respect to research and development programs and a generation ahead of production requirements. Accordingly, it is virtually impossible to advocate a major new facility on the strength of specific future programs, for in many cases the facility must exist before the technologies necessary to the program can be identified.

The Wright Brothers and their predecessors, for example, used wind tunnels to determine the relative lift efficiencies of variously shaped and differently curved wings. Similarly, we would have had great difficulty developing a rocket engine restartable in space if we hadn't possessed high vacuum "space" chambers where the environment could be simulated, or to diagnose problems and failures we experience in the development process.

As a corollary to this observation that facilities must precede programs, it is interesting to note that historically new facilities are seldom used for—or at least confirmed to—the purposes for which they were intended.

The Central Inertial Guidance Test Facility (CIGTF) at Holloman AFB, N.M., for instance, was first designed for the testing of gyroscopes. Along with the seven-mile, high-speed sled track, also at Holloman, the guidance facility has since proven to be indispensable in the development of the ballistic missile, and both are now used for testing inertial navigation systems for aircraft (such as the F–111 avionics package), for testing terminal seekers used on air-to-ground missiles, and for a variety of other purposes. The sled track has proven especially versatile; only about 15 percent of utilization today is in support of guidance tests.

As a matter of fact, the entire $42 million cost of the CIGTF was more than amortized by its contributions to the ballistic missile program. The launch of the first Minuteman ICBM was completely successful. Yet, any one of the six deficiences first detected in the Holloman tests of the guidance system could have caused it to fail. I might also add that some of the shortcomings on the Minuteman II system, now corrected, were picked up in our Holloman tests.

Of course, the sled track facility has now become an established national resource, and for many reasons. It is used for nose cone materials tests, impact tests, and we ran more than 80 tests to check out the cockpit module escape system for the F–111. Half of those runs were made to verify corrections, and we have had two instances and there are four men alive today who are glad that we could do this kind of testing at ground level.

National preparedness is neither a sometime thing nor a result of random actions. It must be deliberate, and it can result only from perceptive planning and dynamic programming.

I think the late Dr. Theodore von Karman was one of the first and most successful practitioners of the "new" art of technological progressiveness. He recognized, for example, that imaginative and well endowed test facilities are the very roots of national preparedness.

While the Air Force's inventory of research facilities dates back more than 50 years, to the 1917 establishment of McCook Field in Ohio (predecessor to Wright-Patterson), Dr. von Karman's famed "Toward New Horizons" report of 1945 must be credited with greatly increasing the respect of the military for scientific and technical possibilities; just as von Karman's advice to General Hap Arnold in the late 1930s helped break loose the major facility expansion of Wright Field, including the 40,000 horsepower wind tunnel and all the laboratories there.

Arnold Engineering Development Center, Tenn., includes high performance wind tunnels, high altitude simulation propusion test cells, and space simulation chambers.

After World War II, von Karman reported that the substantial German technical progress was "not the result of any superiority in their personnel or engineering competence, but rather was due to the very substantial support enjoyed by their research institution in obtaining expensive research equipment, such as large supersonic wind tunnels, many years before such facilities were even planned in this country."

By using such facilities the Germans, for example, were able to go from initial design to actual flight of the V–2 in under two years—a remarkable achievement in aerodynamics by the standards of the 1940s.

I might point out, incidentally, that some of the German equipment, primarily compressor and exhauster machinery, is still in operation at our Arnold Engineering Development Center, Tenn., after 20-plus years.

The von Karman "shopping list" of nearly a quarter of a century ago called for wind tunnel facilities capable of speeds "up to three times the speed of sound," with large enough test sections to accommodate models of "reasonably large size" including jet propulsion units, and one ultrasonic wind tunnel "for exploration of the upper frontier of the supersonic speed range." He also urged ample facilities "for the study of combustion and other characteristics of propulsion systems at very high altitudes."

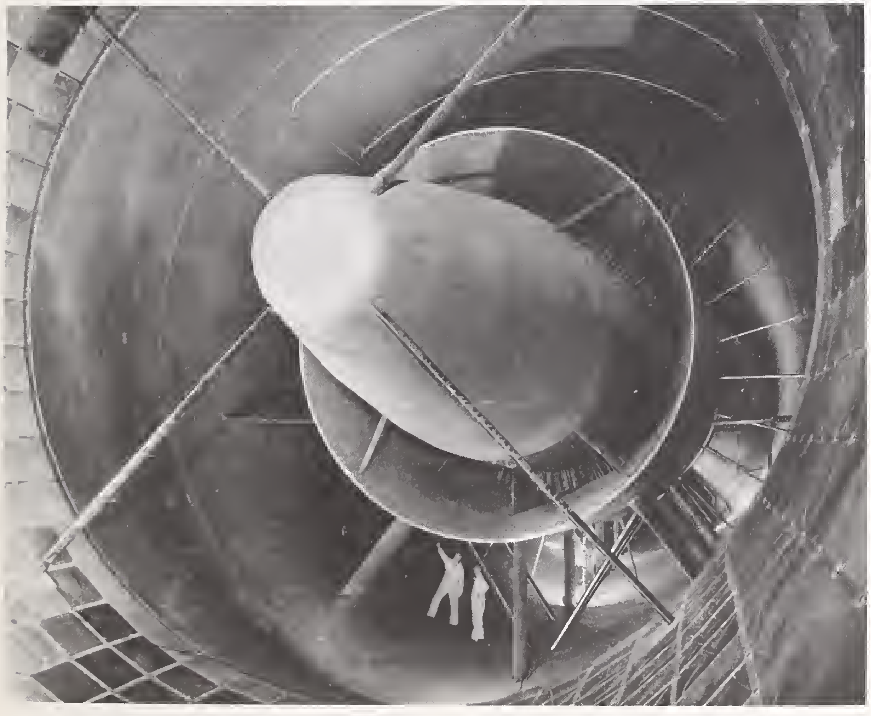
These represented exceedingly ambitious objectives 25 years ago, when the sound barrier was considered an insurmountable obstacle. Justifying such facilities on the basis of specific program needs would have taken some fancy footwork indeed.

Today's Needs Exceed Current Capability

Now, secondly, I said I was concerned because our "try-before-you-fly" facilities of earlier years are reaching the outer limits of usefulness.

For example, just 10 years ago we were quite proud of the fact that we could obtain a mass airflow of 400 pounds a second through one of the engine test cells at our Arnold Center. That was more than we needed.

Today, however, we're testing engines for the C–5A and the SST. The TF–39 engine for the C–5A transport is so large and gulps such tremendous amounts of air that a mass flow of 1,500 pounds per second is required at sea level, which exceeds our current capability.



Compressor for large supersonic tunnel at the $400 million Arnold Engineering Development Center consists of 18 stages. It weighs 878 tons and is 205 feet long.

Accordingly, there is no wind tunnel in the free world capable of testing the TF–39 engine in the portion of its performance envelope ranging from sea level to about 5,000 feet. If the next generation engine reaches the 60,000-pound thrust level, entirely possible, no part of the operating envelope will be availabe to proper simulation, using available facilities. (As a substitute for the present low altitude testing deficiencies, we have mounted a C–5A engine on a B–52 and conducted flight tests. In this sense we're going against historical experience. Over the years we have found that a much greater volume of data can be obtained in a single hour of test cell operations than can be obtained in many days of flight testing.)

The GE–4 engine for the SST operates on a lesser airflow—620 pounds per second—but it requires higher inlet temperatures and pressures than we can presently simulate.

General McKee, as Federal Aviation Administration (FAA) administrator, told me that his agency was concerned because engine growth is rapidly out-pacing the capability for engine test. He called that "a situation in need of correction" and pointed out that it is also unfortunate that only one large, airbreathing, engine test cell is available to us today and it is marginal. We will, for example, follow the current TF–39 tests in this cell with tests of the SST engine beginning early in 1969.

General McKee did not consider this an isolated case. "Parallel development programs for large engines are bound to occur in the future," he said.

There are a number of other major facility needs of a national character. Let me mention just a few of them.

For one, we need a wind tunnel that will enable us to test a vertical takeoff and landing (VTOL) aircraft over the entire performance range of its transition from vertical to horizontal flight. Perhaps the lack of such a facility partially explains why there have been 55 VTOL, or vertical and/or short takeoff and landing (V/STOL), projects and 36 VTOL aircraft built in recent years—all without sufficient success to justify production.

A second indicated need is for a 200-foot vacuum chamber capable of simulating the space environment. A chamber this size would permit the testing of complete space vehicles, including provisions for docking and for extravehicular personnel excursions.

Third, the effectiveness of our defensive ballistic missiles could be improved, if we had a shock interaction facility to simulate the aerodynamic flow and strong shock generated over warhead models. This would involve shock tubes capable of superimposing a simulated, nuclear-blast shock wave on a test model enabling us to study and validate shock interaction theories.

A fourth need, and one we have been aware of for several years, is for a true temperature tunnel (TRIPLETEE), a hypersonic wind tunnel capable of duplicating flight conditions at hypersonic speeds and temperatures.

Some industry proponents claim that hypersonic transport (HST) technology today is just about where SST technologies were in 1954 or 1955. Really meaningful progress in achieving the ten-fold speed transition, from present jet transports to the HST, however, will depend on greatly extending our knowledge in materials, in cooling technologies, in hypersonic aerodynamic and propulsion technologies, and in the integration of the airframe and the propulsion system.

As an example of the temperature extremes involved, the leading edge of the HST wing will heat to 2,000 degrees F. (four or five times higher than the SST), while the fuel tanks will have to hold the liquid hydrogen at a temperature of minus 423 degrees.

Although requirements like these seem quite challenging today, the TRIPLETEE would enable us to solve many of the temperature, aerodynamics and propulsion problems to be encountered in hypervelocity flight.

TRIPLETEE is an example of the way we in the Defense Department must continuously and collectively peer into the future, and bring both foresight and insight to bear on the obstacles and opportunities ahead of us there. We share a common responsibility, at both the advocacy and approval levels, to identify the facilities needed and to do so in sufficient time to plan and acquire them.

We do not need to peer into the future at all to recognize another need which the right kind of facility might satisfy.

The situation which continues to frustrate us in Southeast Asia suggests that we might well benefit, substantially, from a synthetic battleground where those things peculiar to modern warfare at the so-called "limited" level could be tested. No such "full spectrum" battle simulator exists today, in either concept or prototype form.

Surely, we can no longer delude ourselves that the term "limited" can be equated with "simple" or insignificant. Whatever the condition of the country engaged in aggression, the battles fought over that country can involve clever people and highly sophisticated weapons. Furthermore, where technology is not native to a country, it can easily and quickly be imported. The illusion that our enemies are night crawlers in black pajamas, poorly armed and poorly fed, is the great myth of the Vietnam conflict.

Accordingly, facilities which would enable us to test electronic gear, aircraft and other weapons, and advanced munitions in accurately simulated combat environments would go a long way toward improving our capability to fight or deter future wars.

The third area of concern, I mentioned earlier, was the possibility of losing technological leadership to those who have learned from us the fundamental importance of owning facilities adequate to explore the unknown and to test the uncertain and untried.

While much of what the Soviets are doing in their research and development programs is not visible (or does not "show up" until the hardware stage), there are, of course, certain indications of their actions.

A review of Soviet patent releases, for example, reveals that they are making considerable progress in advanced wind tunnels, propulsion test cells, and space chambers. Their low density, wind tunnel facilities are reportedly the equal of anything in the United States. Izvestia has printed pictures of the AN–22, the large Soviet airplane exhibited at the Paris air show, undergoing model tests in a wind tunnel.

Wearing a space suit and helmet in an underwater environment that closely simulates space, First Lieutenant Daniel Seger tests a power tool developed for use by astronauts. The tests were performed in a swimming pool at the Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio.

In the space area, a Soviet aeromedical scientist spoke at a recent astronautical conference on the exacting simulation tests to which their space crews and vehicles are subjected. And it has been reported that every command given to the USSR Venus probe was first given to a duplicate vehicle in a space environmental chamber.

We are keeping an eye on facility developments overseas since an awareness of our opponents' test capabilities can furnish us some insight into their military pursuits or signal their technological intentions. It remains, of course, for us to act wisely on what we observe or deduce.

My fourth and final concern pertains to the importance of continuing to recognize our major research and test facilities as national resources in the best sense of that word.

They are national, first, by virtue of their diversity.

In any single week, the $1.5 billion of national facilities, entrusted to the stewardship of AFSC, are being used for hundreds of purposes, ranging from the testing of new counterinsurgency equipment to the simulation of a nuclear explosion.

In addition to our own in-house requirements, these facilities are being utilized by the Army, the Navy, National Aeronautics and Space Administration (NASA), the Atomic Energy Commission, the FAA, Advanced Research Projects Agency (ARPA), Defense Communications Agency (DCA), the major air commands, and the many American companies doing business with and for the Government.

In support of national needs, ranging from Vietnam to space, AFSC facilities are being used for such diverse purposes as testing a new five-kilowatt fuel cell that may be used as a power supply for the advanced versions of the Manned Orbiting Laboratory, developing a plasma arc lamp for better battlefield illumination, subjecting the panels and boron composite sections of the F–111 to sonic fatigue tests, running bullet impact tests for the purpose of reducing the vulnerability of combat aircraft, and determining the effect of micrometeorites on spacecraft.

The facilities we manage are national resources, secondly, by virtue of their broad applications.

Along with the military and space programs these facilities support, there are a variety of other applications of national significance which they serve.

- The 15,000-foot instrumented runway and excellent weight and balance facility at Edwards AFB, Calif., have been made available in support of the DC–8, DC–9, 727 and 737 jetliner certifications.
- At the Inhalation Exposure Facility of our Aerospace Medical Laboratory, technicians are studying the implications of long-term exposure to common chemicals threatening pollution to the atmosphere. The findings of these studies will be applied to the Federal standards being set for "clean air."
- That same laboratory's Bio-Acoustic Research Facility is measuring possible effects of the sonic boom on communities, and collaborating with other Federal agencies in auto crash research.
- At Cape Kennedy, Air Force tracking equipment has been used to track commercial communication satellites from launch to orbit.

These facilities are national resources, third, by virtue of their value to our economy and our national objectives.

Over the years, tests in large environmental facilities have saved many years, many lives, and many millions of dollars in the development of vital aerospace systems. While testing in these facilities can never completely replace flight testing, ground tests have been confirmed as the only way to reasonably assure that the first flight attempt will have a good chance for success.

A spokesman for NASA, for example, told us recently that the superior test program conducted at our Arnold facility on their J–2 engine gave NASA the final measures of confidence they needed to go ahead with the first Saturn flight test. These facilities cost a few millions of dollar. Consider what the costs would be of a single Saturn flight failure.

We also feel that through the years the large test facilities in our national inventory have given American industry an unbiased proving grounds, where their products and technologies can get objective testing, and enable firms to compete according to common performance standards and conditions.

Facilities afford us a hard-data test bed for the clinical evaluation of proposed hardware. When we issued requests for proposals for the inertial navigation for the F–111 Mark II avionics package, we had 13 competitive systems proposed. Instead of having to make a choice strictly on the paper presentations, we applied the hardware to the test environment and attained sound data to use as a decision basis.

Sometimes our customers get more than they bargain for. At Holloman AFB recently we were sled-track testing a guidance subsystem for a potential contractor. The purpose was to use the sled to simulate rocket liftoff vibrations. But the sled malfunctioned on the test run, overshot its water brakes, and sailed off the north end of the track at about 125 miles per hour. Data revealed that the test item had continued to function after the incident. So the customer got three tests—sled, flight and impact—all for the price of one.

Problems of Future Facilities Planning

In projecting the kinds of facilities being discussed into the future, there are two problems that will have to be overcome. One is our ability to identify, program, and build technical facilities advanced enough to serve future requirements. The second problem is to be persuasive enough in our proposals to merit the confidence of the decision makers in approving facilities to support systems still in the "possibility" stage.

As mentioned earlier, it is hard to match this requirement against such clearly identified needs as more aircraft, additional ballistic missiles, better limited war equipment, or improved personnel living quarters.

Nevertheless, the problem of timely acquisition is becoming critical. The resources so useful to the nation today must be assured for tomorrow. We need to recapture the spirit of Arnold and the foresight of von Karman, if we are again to reach far out into the future in our facilities planning.

Unfortunately, while many of yesterday's test facilities were relatively simple and inexpensive, those needed

(Continued on Page 16)

Management Systems Control—A Progress Report

Colonel Albert W. Buesking, USAF

During the past 15 months since I first reported on actions being taken to effect management systems control within DOD (see article "Management Systems Control," *Defense Industry Bulletin*, March 1967, page 26), a significant development in management improvement has taken place. There has been increasing concern with the proliferation of management controls and reporting requirements applied on DOD contracts for the acquisition of goods and services. In May 1966, the Aerospace Industries Association presented the Systems Management Analysis Group (SMAG) Report to the Defense Industry Advisory Council. At about the same time Robert N. Anthony, Assistant Secretary of Defense (Comptroller), was voicing his concern with the same problem. In a speech delivered in March 1966, Mr. Anthony remarked:

> During the last decade the Military Departments have developed and produced a wide variety of weapon and support systems, and they have also designed a wide variety of Management Systems for dealing with these major acquisitions. Each manager has separately wrestled with the problem of devising a system for describing plans, for measuring and controlling progress against these plans, and for recording experience so that the estimating and management job could be done better next time. The result has been a proliferation of systems, reports and acronyms.

A Department of Defense/Council of Defense and Space Industry Associations (CODSIA) Advisory Committee was established to report to Mr. Anthony and conduct an evaluation of the problem during the two-year period starting in November 1966. The work was divided into three distinct phases as follows:

- Phase I covering the initial planning completed in January 1967.
- Phase II covering the need-use analysis of selected management systems, the development of principles and procedures, and preparation of two DOD instructions completed on March 31, 1968.
- Phase III covering the actual implementation of the results of Phase II and scheduled for completion by mid-1970.

Colonel Albert Buesking, USAF, is Dir. of Management Systems Control, Office of the Asst. Secretary of Defense (Comptroller). In prior assignments he was responsible for programming and financial management of the Minuteman weapon system program at Ballistic Systems Division, and was a budget advisor to the Turkish General Staff. He holds a B.S. in Business Administration from Butler University, and an M.B.A. with distinction from Harvard Graduate School of Business.

With the completion of Phase II, the findings of the DOD/CODSIA Advisory Committee were published in the Final Report, dated March 1968, and the control mechanism was approved by Mr. Anthony in May 1968.

The Final Report dealt with the two key tasks identified by the DOD/CODSIA Advisory Committee:

- The *preventive* job of forestalling undesirable proliferation of management control systems in the future.
- The *corrective* job of reducing existing proliferation.

The report, comprised of four volumes, deals broadly with these two issues and six appended studies of the operation of existing management control systems in selected functional area (systems engineering, integrated logistic support, finance and schedule, work breakdown structure, data management, and DOD source documents).

Volume I introduces and emphasizes the concept of a "management control system" as an analytic framework for evaluating how well DOD system documents perform the functions for which they are designed. It defines the concept as follows:

> A management control system is an orderly way, generally including a documented procedure, of assisting managers in defining or stating policy, objectives and requirements; assigning responsibility; achieving effective utilization of resources; periodically measuring performance; comparing that performance against stated objectives and requirements; and taking action.

The use of this framework led to the recognition of several incisive points with respect to DOD management practices:

- DOD parent management system documents, in many cases, do not fit together to operate as parts of an efficient system, but rather develop, duplicate and, occasionally, conflict with each other.
- Among the causes of these difficulties are the functional orientation of some documents, the breadth of statement of objectives, the varying definition of terminology, and the non-uniform implementation of some broadly worded DOD documents.
- Management systems designers could help to alleviate these problems by constructing their systems with a view to achieving a clearly envisioned mode of management: visibility, surveillance, or prior approval.

Volume IV represents a summary of the "need/use" reports worked on by the DOD/CODSIA teams and contained in the appendixes of the Final Report. Among the specific recommendations made in Volume IV are:

- The need for the development of a total integrated systems engineering concept.
- The need for greater implementation of the concept of integrated logistic support by extending systems engineering concepts and practices into the operational phase.
- The mandatory use of a single work breakdown structure to correlate technical performance, schedule and cost information.
- The development of better integration of the several reporting requirements in the finance and schedule area.
- The creation of a DOD Authorized Data List.

Volume III of the report sets up the framework for the implementation of the recommendations mentioned before. Specific plans in the areas previously cited have been developed to support this Master Implementation Plan.

Volume II describes the working of the control system for new management proposals developed by the DOD/CODSIA Committee and ultimately crystallized in DOD instructions recently signed by Mr. Anthony. It is worthwhile to look at the operation of this control system in some detail. The control system is comprised of three parts:

- An instruction on the Development of Management Control Systems, DOD Instruction 7000.6, June 6, 1968, (the development instruction).*
- A Management Control Systems List (MCSL) published as a supplement to Armed Services Procurement Regulation (ASPR).
- An instruction on the Selection and Application of Management Control Systems, DOD Instruction 7000.7, June 6, 1968, (the application instruction).*

Development Instruction

The development instruction provides that only management control systems listed on the Management Control Systems List may be contractually applied. All existing systems have been placed on the list. All

Review on Proposals Under the Development Instruction

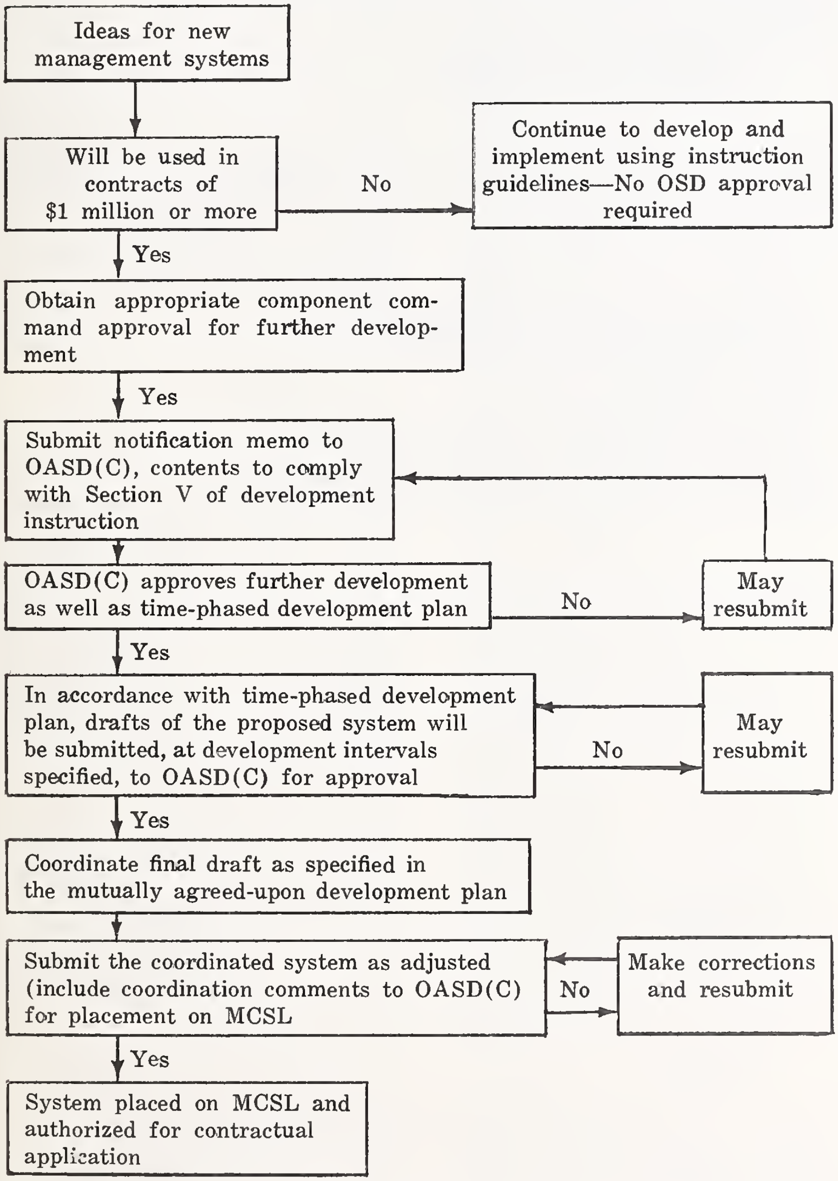

Ideas for new management systems
Will be used in contracts of $1 million or more
No
Continue to develop and implement using instruction guidelines—No OSD approval required
Yes
Obtain appropriate component command approval for further development
Yes
Submit notification memo to OASD(C), contents to comply with Section V of development instruction
OASD(C) approves further development as well as time-phased development plan
No
May resubmit
Yes
In accordance with time-phased development plan, drafts of the proposed system will be submitted, at development intervals specified, to OASD(C) for approval
No
May resubmit
Yes
Coordinate final draft as specified in the mutually agreed-upon development plan
Submit the coordinated system as adjusted (include coordination comments to OASD(C) for placement on MCSL
No
Make corrections and resubmit
Yes
System placed on MCSL and authorized for contractual application

Figure 1.

Non-subscribers to the service for obtaining copies of DOD Directives and instructions may obtain referenced DOD instructions, one copy per request, from: Naval Supply Depot, Attention: Code 300, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

proposed new or substantially modified systems must pass through the approval procedures portrayed in Figure 1, prior to contractual application. Basically, these procedures simply call for determination by the Assistant Secretary of Defense (Comptroller), in conjunction with the office of primary responsibility in the Office of the Secretary of Defense, that a proposed management control system is not redundant with respect to existing systems, and that it will in fact optimally serve the objectives for which it is designed.

MCSL Content

The MCSL is designed for use by both systems designers and line managers. Each document is indexed and cross referenced in such a way that it may be readily called out of the automated file. It is hoped that by grouping documents in such manner enabling quick comparison by function, life-cycle stage, etc., both systems designers and line managers can be better equipped to help prevent future overlaps in intent, function, or data product call-out of management control systems.

Application Instruction

The application instruction is designed to provide guidance to program/project managers in the selection of management control systems from the MCSL and their application to the contract, through their listing on the new DD Form 1660 (Management Control Systems Summary List). No management control system or any of its associated data products may be contractually required in the absence of listing on the DD Form 1660. Figure 2 illustrates the operation of this instruction.

The objectives of this instruction are fundamentally threefold:

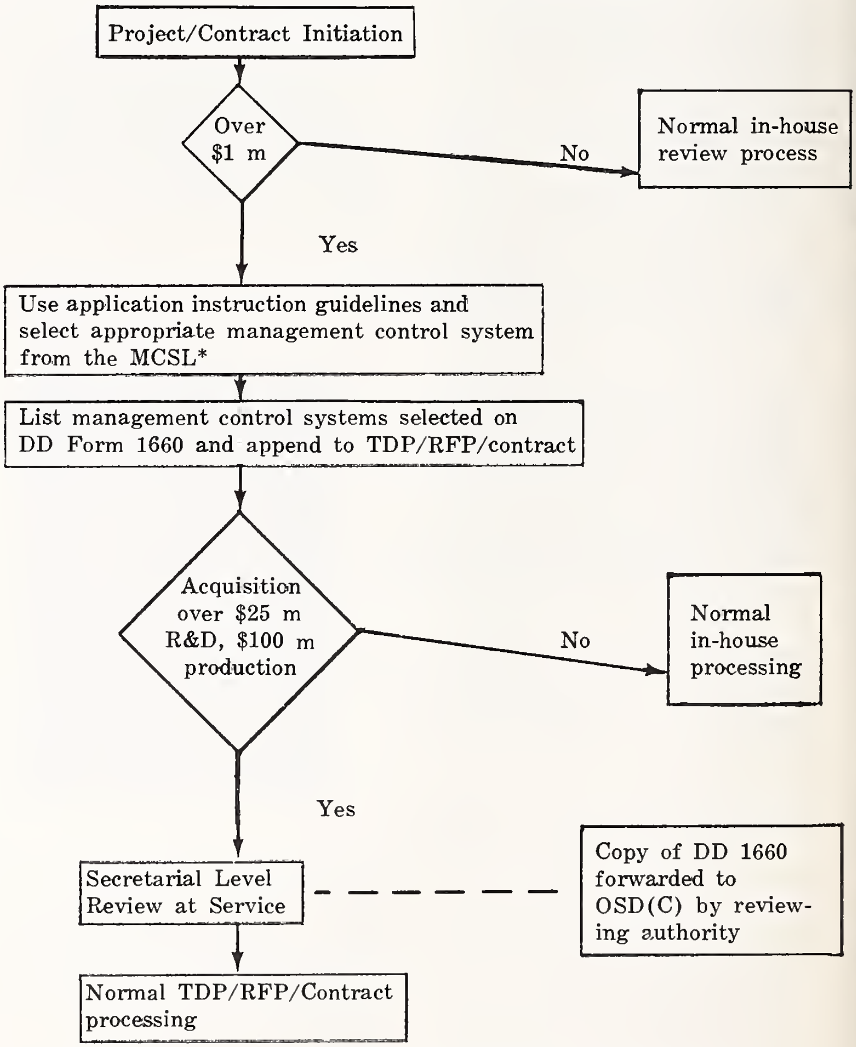
- To assure that management control systems are used to assist in managing the acquisition, and not as an end in themselves.
- To assure that more than one management control system, calling for data satisfying the same DOD management requirement, will not be specified on a contract.
- To orient managers toward the selection of management control systems which consistently implement a "mode of management."

As discussed in the application instruction, a mode of management is the type of constraint which a group of management control systems, applied by a program/project manager, collectively impose on a contractor. The modes of management are defined as:

- "Visibility"—An identifiable contractor's management control system exists and its elements can be made available for government examination, as required.
- "Surveillance"—The examination of the contractor's status through the media of government-specified periodic reports, but without prior government review and sanction of specified contractor actions.

The application instruction seeks to relate selection of the mode of management to the variables in the contractual environment which have been defined in ASPR and other official DOD documentation, including nature of work, life-cycle phase, and degree of risk shifted by a contract to the contractor. The instruction also introduces the concept of the downward "tailoring" of management con-

The Role of the Application Instruction


Project/Contract Initiation
Over $1 m
No
Normal in-house review process
Yes
Use application instruction guidelines and select appropriate management control system from the MCSL*
List management control systems selected on DD Form 1660 and append to TDP/RFP/contract
Acquisition over $25 m R&D, $100 m production
No
Normal in-house processing
Yes
Secretarial Level Review at Service
Copy of DD 1660 forwarded to OSD(C) by reviewing authority
Normal TDP/RFP/Contract processing

*Note: Development instruction governs accession of management control systems to MCSL.

Figure 2.

trol systems to fit the mode of management selected for a particular acquisition. It recommends the deletion of those data product requirements of a management control system which are not, in the light of all of the facts surrounding the acquisition, necessary for adequate DOD management.

Conversion of the MCSL into an Authorized MCSL

As a result of follow-through on the Implementation Plan for the modification of existing management control systems, described before, and the operation of the control system, more and more management control systems will receive approval by the Assistant Secretary of Defense (Comptroller). The need for many previously utilized, procedurally oriented documents will be removed by the issuance of new documents, and they will be deleted from the MCSL. Ultimately, then, an "Authorized" MCSL will be published. Only management control systems authorized for application by the Assistant Secretary of Defense (Comptroller) will be contained in the Authorized MCSL.

The Job Tomorrow

The formal promulgation of the Management Control Systems List and associated instructions represent the beginning rather than the end of the systems control effort. In part, its success will depend upon the ability of Assistance Secretary of Defense (Comptroller) to rapidly process requests for new management control systems, and thus avoid being a bottleneck in the overall management of programs. In major part, however, the effectiveness of the control plan will depend on the efforts of those who must live with it. DOD managers must take the time and trouble to evaluate the adequacy of documents already on hand before deciding to create their own forms. Staff managers must orient themselves toward developing broad criteria type systems. In sum, the management systems control program is not a lance to joust at paper dragons, but simply a way to assure that people do the best they can with what they have at hand.

New Research Programs Selected Under Project THEMIS

Forty-three new research programs have been selected by the Defense Department to be performed at universities located in 24 states and the District of Columbia under Project THEMIS.

Objectives of the project THEMIS, initiated last year, are:

- The development of new academic centers of excellence capable of contributing basic knowledge toward the solution of important defense problems in the future.
- Wider geographical distribution of defense research funds, giving preference to institutions that receive little or no DOD support.

These research programs are unclassified.

In 1968, 412 research proposals were submitted. A preliminary screening reduced the number to 96. Following on-site visits and in-depth evaluations of each remaining program, the 43 programs identified in the following list were selected:

University of Arizona. Precision optical systems.

Arizona State University. Detection devices, techniques, theory.

Catholic University. Vitreous state structure and dynamics. Dynamics of cable systems.

Colorado State University. Tropical weather disturbances, surface effects. Predictability of low-altitude winds.

University of Cincinnati. Internal aerodynamics, air-breathing engines.

University of Connecticut. Structural fatigue.

Drexel Institute of Technology. Powder metallurgy. Forecasting by satellite observations.

Florida State University. Prediction of tropical weather phenomena. Computer assisted instructions and training.

University of Hawaii. On-line computer systems.

Illinois Institute of Technology. V/STOL aerodynamics.

University of Iowa. Vibration and stability of military vehicles. Application and theory of automata.

Jefferson Medical College. Pathogenesis of acute diarrheal disease.

Kansas State University. Electronic components, nuclear radiation effects.

Kent State University. Liquid crystal detectors.

University of Kentucky. Metal deformation processing.

Lehigh University. Non-linear wave propagation. Low-cycle fatigue in joined structures.

University of Louisville. Performance assessment and enhancement.

University of Mississippi. Biocontrol systems.

University of Missouri (Rolla). Aqueous aerosols in atmospheric processes.

North Carolina State University. Digital encoding systems.

University of North Dakota. High pressure physiology.

North Dakota State University. Control of vectors of diseases of military importance.

University of Oklahoma. Mechanism and therapy of shock.

Rensselaer Polytechnic Institute. Electrochemical power sources. Radiation effects on electronic materials.

Rice University. Coherent and incoherent EM radiation.

Medical College of South Carolina. Resuscitation and treatment of wounded.

Southern Methodist University. Statistics in calibration methods.

Stevens Institute of Technology. Evaluation of terrain-vehicle systems.

University of Tennessee. MHD power generation. Remote sensors for environmental systems.

Texas A&M University. Aircraft dynamics for subsonic flight.

Texas Technological College. Human performance under stress.

Vanderbilt University. Coating science and technology.

University of Vermont. Isolation and sensory communication.

University of Virginia. Atomic interactions in gases.

West Virginia University. V/STOL aerodynamics.

Hubbell Report Recommends Change in Military Pay System

[Editor's Note: This article was prepared by the staff of the Military Compensation Policy Board under the direction of Rear Admiral Lester E. Hubbell, USN.]

In April 1968, Secretary of Defense Clark M. Clifford sent to Congress the results of the first quadrennial review of the military pay structure. The first portion of the report, on active duty pay, recommended "the most fundamental change ever proposed in the military compensation compensation system."[1]

The study of military pay was made to comply with Section 1008(b), Title 37, U. S. Code, which requires the President at least every four years to ". . . direct a complete review of the principles and concepts of the compensation system for members of the uniformed services . . . ." and to ". . . submit a detailed report to the Congress summarizing the results of such review together with any recommendations he may have proposing changes in the statutory salary system and other elements of the compensation structure provided members of the uniformed services."

The Military Compensation Policy Board,[2] made two initial policy decisions:

- No uniformed service member was to suffer any net reduction in total pay as a result of the study's recommendations.
- The study was to concentrate on the principles and concepts of military compensation rather than try to justify a military pay raise.

Headed by Rear Admiral L. E. Hubbell, USN, an Interservice Task Force, supplemented and augmented by consultants and advisors from other government agencies, found that the military pay system is cumbersome, complex, confusing, inequitable and inefficient for the type of force that has developed since the Korean War.

Study Goals

The study had two specific goals. The first was to evaluate the existing military compensation system's effectiveness in attaining a two-part objective:

- To provide a fair and equitable relationship between military compensation and that of civilians with similar qualifications.
- To attract, retain and motivate to career service the kinds and numbers of people that our uniformed Services need.

Rear Admiral Lester E. Hubbell, USN, Dir., Compensation and Career Development Office of the Asst. Secretary of Defense (Manpower and Reserve Affairs).

The second goal was to develop specific recommendations on those changes needed to modernize the military pay system.

Begun in March 1966, the study entailed considerable research into military, government civilian, and private civilian pay structures. Fact finding included:

- Survey of civilian occupations held by 280,000 ready reservists with more than two years active duty.
- Collection of Bureau of Census data on earnings in 88 civilian occupations.
- Survey of occupations and earnings of 100,000 retirees.
- A 5-percent sample survey of active duty pay records to establish typical earnings based on length of service and dependency status.
- Comparison (by Budget Bureau and Civil Service Commission experts) of enlisted and officer grades with blue collar and white collar grades of civilian government employees by duties and responsibilities.
- Study of compensation principles, concepts and practices in military forces of other countries, other Federal salary systems, and the private sector of the economy.

The study revealed that a simple pay raise is not the answer, nor is tinkering with the already outmoded system. Military compensation has to be overhauled to bring it abreast of four significant changes in the composition of the forces.

Since the United States has assumed leadership of the free world, the country needs larger and different kinds of active military forces than when a small cadre of active forces was sufficient.

The military career pattern has changed. Operational units need larger numbers of younger, more vigorous personnel than did cadre forces of senior leaders and trainers. Formerly the military could offer a reasonable prospect of a full career to retirement to all who entered the career force. Now the Services need personnel in three categories: those who serve only their minimum military obligation; those who voluntarily serve for some additional period but not to retirement; and those who voluntarily serve until retirement. The military pay system must be fair to members of all three groups.

---

[1] *Memorandum transmitting Summary of First Quandrennial Pay Study to the Secretary of Defense from the Military Compensation Policy Board.*

[2] *Chaired by the Assistant Secretary of Defense (Manpower and Reserve Affairs) and comprised of the Service Under Secretaries and Deputy Under Secretaries for Manpower, the Assistant Secretary of Defense (Comptroller), the Special Assistant to the Director of the Bureau of the Budget, and the Service Deputy Chiefs of Staff for Personnel.*

The technological revolution that has swept through our society has impacted especially severely on the military. The weapons and equipment are vastly more complex than in past decades. The impact of these changes on military compensation is obvious, but no less important. Modern military pay must be aimed at new kinds of people with new ranges of opportunities, and must meet the competition from the civilian private sector.

Perhaps most important for pay purposes, the military is no longer so different from the rest of society that meaningful comparisons cannot be made between the two. In an earlier time, the military was rather sharply segregated from the civilian society. Now the military is much more a part of society. Large manpower needs of modern forces has created millions of veterans. Public interest and discussion of military matters has kept the military aware of and responsive to public reaction. Sheer size has caused much of the military population to spill over into civilian communities. Miltary people compare their pay with their civilian neighbors, and shop in the same markets.

Two Parts of the Force

Early in the study it became apparent that there are two distinct groups in the military forces, non-careerist and careerists, for whom pay principles and concepts must be evaluated separately.

The vast majority of non-careerists are young, single citizen-soldiers fulfilling a military obligation. Their average age is 20 years; 84 percent have no dependents; only 2 percent have 3 or more dependents. Training in a technical skill, useful later in the civilian economy, is a major inducement to enlistment. More than 80 percent will return to civilian life at the end of their first tour; less than 10 percent will retire from service.

Economy and military necessity require that these young, non-career enlisted men be housed, fed, clothed, and provided medical care, dental care, and other essential services, in kind, on government facilities. While the draft insures adequate numbers of non-career personnel, society incurs the obligation to compensate them fairly and equitably with their civilian counterparts who do not serve.

The study revealed that the average non-careerists earn residual income comparable to that of their average civilian cohorts during their four years of obligated service. Table 1 summarizes the residual income of non-careerists and civilian high school graduates.

No significant changes were recommended for compensation of non-career enlisted men. They would continue to live on military installations, eat in government dining halls, and receive "personal money pay" in cash.

Comparison Non-Career Enlisted With High School Graduate Cohort Income

Years of Service	Age	Residual Income: Military	Residual Income: Civilian High School Graduate
1	19	$1,202	$1,198
2	20	1,522	1,296
3	21	1,985	1,393
4	22	2,403	1,471
Cumulative		$7,112	$5,358

Table 1.

Overhaul Career Force Pay Structure

In the part of the force structure inhabited by careerists, the study group found the greatest need for pay overhaul.

Under the present system of pay and allowances, there are over 26 separate elements of compensation:

- Salary elements: basic pay; quarters and subsistence allowance, which are paid tax-free when quarters and subsistence are not furnished in kind; and the tax advantage of tax-free allowances.
- Special and incentive pays: incentive pays for hazardous duty; reenlistment bonuses; professional, responsibility and proficiency pays; and separation pay.
- Supplemental benefits: provisions for retirement accruals; dependents indemnity and compensation; death gratuities; social security; medical care; commissary and exchange savings; FHA mortgage insurance premiums; and unemployment compensation.
- Noncompensation personnel costs: clothing issues and allowances; family separation allowance; dislocation allowance; overseas station allowance; burial costs; annd extra hazard on service life insurance.

A key problem found in the career force was a deficit in the numbers of persons in the middle experience range—four to 14 years of service. This deficit of personnel in the midrange of experience levels has existed for many years, despite increases in basic pay and other compensation elements costing $3.5 billion since 1962. Because of this chronic shortage, the Defense Department has been forced to use inadequately experienced personnel simply because they were the only ones available.

Compensation was found to be a major cause of the problem.

Recent increases in salaries for Federal civilian employees have already attracted better qualified people, thereby providing a wider base from which to select personnel. It is clear that the uniformed Services must take similar measures.

Military personnel lack confidence in the system because it is complex and confusing, it does not reward men equitably, and it cannot be compared and adjusted objectively to related to trends in civilian earnings.

Consequently many members leave military service for supposedly higher paying civilian jobs. However, they often find they have less disposable income than in service because they undervalued payments in kind (housing and subsistance) or the advantages of untaxed allowances, and savings provided through the commissaries, exchanges and medical facilities.

The multitude of pays, allowances, tax advantages, savings and compensations in kind is so confusing that 99 percent of military personnel don't know how to compute their value, much less compare it with the salaries of their civil service or other civilian cohorts. A Louis Harris poll conducted for the Navy revealed military personnel underestimate the value of their earnings by 10 to 24 percent. Banks and finance companies in the Washington, D.C., area underestimated actual salaries by as much as 50 percent. One lender stated the situation: "If the man doesn't get it in cash, the I don't even stand a chance of getting my hands on it, and it's not income as far as I'm concerned."

The portion of pay that is tax-free allowances or tax-free compensation in kind rewards men according to their income tax deductions, or their family size, rather than according to their rank or job. Furthermore, the allowances for quarters and subsistence (food) have not been adjusted to keep pace with actual costs.

Under the present pay scheme, imputed retirement contribution is considered part of total salary, but only a minority of the personnel (46 percent of career enlisted men and 18 percent of officers) retire and realize the benefit. Presently military retirement is not vested with the individual. This feature discourages mid-length careers and contributes to the imbalance of the forces. About the eighth year of service the retirement incentive begins to take hold and, because of lack of vestment, locks people in careers at least until retirement at 20 years.

Comparability with Civilian Earnings

In his April 1967 pay message to Congress, President Johnson stated that military pay should be comparable to government civilian pay. The across-the-board pay raises of 1966 and 1967 were based on this comparability of civilian pay principle.

One question before the pay study group was: Are members of the uniformed Services now paid at parity with their civil service counterparts? Two separate studies answered a clear-cut "no." It was obvious that military pay must catch up with federal government civilian wages.

The task group studied the military and civilian occupations of 280,000 reservists and Bureau of Census data on earnings of civilians of similar occupations. From this data an average salary was derived for each enlisted and officer grade (E–4 through 0–8) to match the average earnings of civilian cohorts. Adjusted for the still existent lag of civil service salaries behind private sector

Military Career Force Lag Behind Cohort Parity

Pay Grade	Average Salary Required for Parity with Cohort	Adjusted Average 1 October 1967 Military Salary (1)	Difference		Amount of Lag ($ Million)
			$	%	
0–10	$40,138	$35,614	$ 4,524	11.3%	$ 0.2
0–9	34,602	31,070	3,532	10.2	0.4
0–8	29,324	27,151	2,173	7.4	1.1
0–7	28,559	23,562	4,997	17.5	3.3
0–6	24,287	19,724	4,563	18.8	78.3
0–5	19,759	16,670	3,089	15.6	127.4
0–4	15,201	13,736	1,465	9.6	101.7
0–3	11,188	11,403	— 215	— 1.9	—23.8
0–2	8,353	8,852	— 499	— 6.0	—29.4
0–1	7,700	6,615	1,085	14.1	78.1
Comm Off	$12,435	$11,528	$ 907	7.3%	$ 337.3
W–4	$15,473	$12,904	$ 2,569	16.6%	$ 10.8
W–3	11,836	10,887	949	8.0	3.3
W–2	10,151	9,310	841	8.3	6.2
W–1	8,459	8,217	242	2.9	2.4
Warr Off	$10,595	$ 9,694	$ 901	8.5%	$ 22.7
All Off	$12,319	$11,412	$ 907	7.4%	$ 360.0
E–9	$12,050	$10,633	$ 1,417	11.8%	$ 23.2
E–8	9,670	9,301	369	3.8	15.7
E–7	8,112	8,191	— 79	— 1.0	—11.4
E–6	7,271	7,134	137	1.9	38.5
E–5	6,552	5,918	634	9.7	318.1
E–4	5,830	5,123	707	12.1	181.0
Career EM	$ 6,927	$ 6,472	$ 455	6.6%	$ 565.1
			TOTAL	6.9%	$ 925.1

---

(1) Adjusted to reflect imputed retirement credit of 6.5 percent of military salary.

Table 2.

civilians, military pay trailed civilian parity pay by 6.9 percent. Table 2 compares military payline salaries with salaries of their civilian cohorts in private enterprise.

Budget Bureau and Civil Service Commission experts, in an independent study, analyzed job descriptions and specialties, and linked these with appropriate civil service grades. Through a standardized and systematic evaluation of a large number of jobs in both the military and civil service systems, the personnel specialists found corresponding work requirements and levels of responsibility. They found comparability between 0–8 (major general) and GS–18, between 0–1 (second lieutenant/ensign) and GS–7, and between E–3 corporal/airman first class/seaman) and GS–3 for white collar jobs and Wage Board 5 for that E–8 and 0–2 should be paid the same salaries.

Establishing this linkage between civilian and military jobs enabled the Budget Bureau-Civil Service Military pay team to fit a military "payline" to corresponding civilian grades. The payline is that longevity step that best represents each grade. It is the pivotal salary step for each grade. Actual salaries within each grade would range above and below the payline according to longevity. Based on payline derived from this study, they found military salaries lagged civilian pay by 6.2 percent. Table 3 shows payline salaries as of October 1967, and the adjustments required to bring the military payline into full comparability with government civilian pay.

Military Career Force Lag Behind Civil Service 1 October 1967 Salaries

Pay Grade	Average Salary Required for Parity with Civil Service	Adjusted Average 1 October 1967 Military Salary (1)	Difference $	Difference %	Total FY 1968 Amount of Lag ($ Million)
0–10	$33,791	$35,614	$−1,823	− 5.4%	$− 0.1
0–9	30,144	31,070	− 926	− 3.1	− 0.1
0–8	27,055	27,151	− 96	− 0.4	− 0.1
0–7	25,356	23,562	1,794	7.1	1.2
0–6	22,387	19,724	2,663	11.9	45.7
0–5	18,709	16,670	2,039	10.9	84.1
0–4	14,858	13,736	1,122	7.6	77.9
0–3	11,737	11,403	334	2.8	37.0
0–2	9,327	8,852	475	5.1	28.0
0–1	7,548	6,615	933	12.4	67.2
Comm Off	$12,444	$11,528	$ 916	7.4%	$ 340.8
W–4	$15,126	$12,904	$ 2,222	14.7%	$ 9.3
W–3	12,431	10,887	1,544	12.4	5.4
W–2	10,029	9,310	719	7.2	5.3
W–1	8,406	8,217	189	2.2	1.9
Warr Off	$10,568	$ 9,694	$ 874	8.3%	$ 21.9
All Off	$12,325	$11,412	$ 913	7.4%	$ 362.7
E–9	$11,330	$10,633	$ 697	6.2%	$ 11.4
E–8	9,432	9,301	131	1.4	5.6
E–7	8,219	8,191	28	0.3	4.1
E–6	7,242	7,134	108	1.5	30.4
E–5	6,356	5,918	438	6.9	220.3
E–4	5,865	5,123	742	12.7	189.8
Career EM	$ 6,843	$ 6,472	$ 371	5.4%	$ 461.6
			TOTAL	6.2%	$ 824.3

---

(1) Adjusted to reflect imputed retirement credit of 6.5 percent of military salary.

Table 3.

Task Group Recommends Cash Salary

These findings lead to the recommendation that the same salary should be paid to all career personnel of the same grade and years of service, without regard to dependency status or quarters occupancy status. Longevity increases within each grade would be retained. However, promotion to the next higher grade would be more lucrative than increases due to longevity.

Retirement contribution should be vested to the service member and refunded upon termination of service short of retirement. When a member transfers to a reserve component, he retains his potential eligibility for military retirement. Therefore his retirement contribution would not be refundable at the time he separates from active duty. It would be refunded when his potential retirement eligibility ended.

Under the full salary recommendations, career military personnel would no longer receive allowances or payments in kind. Those living on military installations would pay fair rental values for their quarters, exchanges and commissaries would operate on a self-supporting basis, and each person would contribute his share toward a vested retirement annuity.

Some special or incentive pays are fixed amounts; others vary with basic pay and allowances. The task force recommended that fixed special pays remain at present levels, and that

(*Continued on page 20*)

Navy Plans and Mans for ILS

Rear Admiral N. Sonenshein, USN

The Navy is seeking to provide a firm management foundation for an aggressive program to improve support planning by applying the principles of integrated logistic support (ILS). We are now moving rapidly toward conversion of policy and principles into that which is of prime interest to industry, namely, the hard reality of contract specifications. This article will endeavor to fix our present position in relation to the "how" and "when" of this hard reality.

Although the Navy had made considerable progress in the practical application of ILS before DOD Directive 4100.35, "Development of Integrated Logistic Support for Systems and Equipments," was issued, this directive was a major rallying point for Navy personnel already aware of the potential in ILS. It served as an impetus for accelerated progress. Rather than present a chronological discourse of this progress, I will discuss the Navy's approach to ILS by a look at the past and future within each of the following aspects of the total picture:

- Organization.
- Personnel.
- Scope of applicability.
- Policy and procedures.
- Specifications.
- Test and demonstration.

Organization

Although procedural changes are frequently the first steps toward the implementation of many new concepts, ILS faced an earlier hurdle. ILS is not compatible with the conventional logistic function-oriented organization, and this incompatibility must be resolved before effective implementing action can be taken. This hurdle, of course, can exist in industry as easily as in Government.

We soon discovered that our own staff was the first to require reorientation. Specifically, review of the organization at the Headquarters, Naval Material Command (NAVMAT), to identify the office with responsibility over the total functional area of weapon system support planning, revealed a startling fact. While the Navy had long recognized that design decisions create logistic requirements and that weapon system support decisions pertaining to any one element of logistic support must, of necessity, affect the others, the organizational structure of the NAVMAT headquarters did not reflect that recognition. The staff had specialists in spare parts, technical manuals, and the other elements of logistic support, but clear-cut responsibility was not fixed for the critical area of support for an entire weapon system.

Rear Admiral N. Sonenshein, USN, is Deputy Chief of Naval Material (Logistic Support) with responsibility for implementation of integrated logistic support in the Navy. He has held many responsible positions in acquisition management and fleet support, including project manager for the Fast Deployment Logistics Ships Project, and Assistant Chief, Bureau of Ships for Design, Shipbuilding and Fleet Maintenance.

This organizational deficiency was overcome on Oct. 1, 1967, with the creation of the Integrated Logistic Support Division under the Deputy Chief of Naval Material for Logistic Support. Almost all of the personnel for this division were obtained by reassignment from other parts of the headquarters staff. The chart shown in Figure 1 indicates the organization of the new division, and its position in the Headquarters, Naval Material Command.

The balance of the initial organizational aspects revolved around:

- An educational effort to make all directorates in each Systems Command aware of the impact of a continuously integrated approach to logistic support.
- Establishment of an ILS office in each Systems Command headquarters to provide top level management of ILS planning.
- Decision as to where to place the "logisticians" required by DOD Directive 4100.35.

Top level ILS management was provided in each Navy Systems Command. However, where the individual logisticians are to be sited and how many formally designated logisticians there ought to be has not yet been finally determined. Because organizational placement is critical to the question of career pattern, it should follow a compatible standard pattern throughout the Systems Commands.

Personnel

In my view, the really important ILS challenge lies in the area of personnel—not in terms of numbers of logisticians, but in terms of motivation, education, organizational position, and career pattern.

In spite of the use of the term "life cycle support management," ILS has major application to the early acquisition phases, with the majority of the effort being expended in concept formulation, contract definition, and development. It is in this theatre that the logistician will perform, with the size of the stage and the significance and complexity of the script dictating the need for an accomplished performer. The intensity of the ever-present lighting on this stage will soon reveal whether he is up to the task.

What, then, is a logistician, or as we in the Navy have identified him, an acquisition logistician? In the functional sense, he has the responsibility for carrying out ILS planning for a weapon system. To do so, he must understand the process by which we acquire the weapon system. He must know what logistic considerations are pertinent in concept formulation, contract definition, development, and production. In turn, this demands a sound knowledge of the realities of operational logistic support in the Fleet, and intimate acquaintance with the methods used by each logistic element manager (including the Defense Supply Agency and element managers of other Services) to acquire and manage their particular elements.

Rather than having only an administrative background, engineering and technical orientation is required. The logistician should be able to project in quantified terms the effects of alternative logistic system and design proposals on operational support, and to use those projections to influence concept formulation, contract definition, and development decisions. It is important that he have the training, experience, stature and ability to warrant his complete acceptance by project management and development personnel as a valued member of their team.

How to acquire and retain these logisticians is the subject of discussion at the headquarters level of the Naval Material Command and the Systems Commands. In all of these discussions, one factor is accepted as paramount: A clearly defined career pattern for logisticians is essential.

Obviously, providing this career pattern will require a long-term effort. Rather than wait for an ideal solution, we are endeavoring to provide working-level training in the practical application of ILS in weapon system acquisitions. This training is being provided by an intensive one-week ILS course being conducted at the Navy Logistics System School. By the end of 1968, approximately 700 military and civilian personnel will have attended this course. The course not only trains prospective acquisition logisticians, but makes various functional experts aware of the impact of ILS on the total acquisition process.

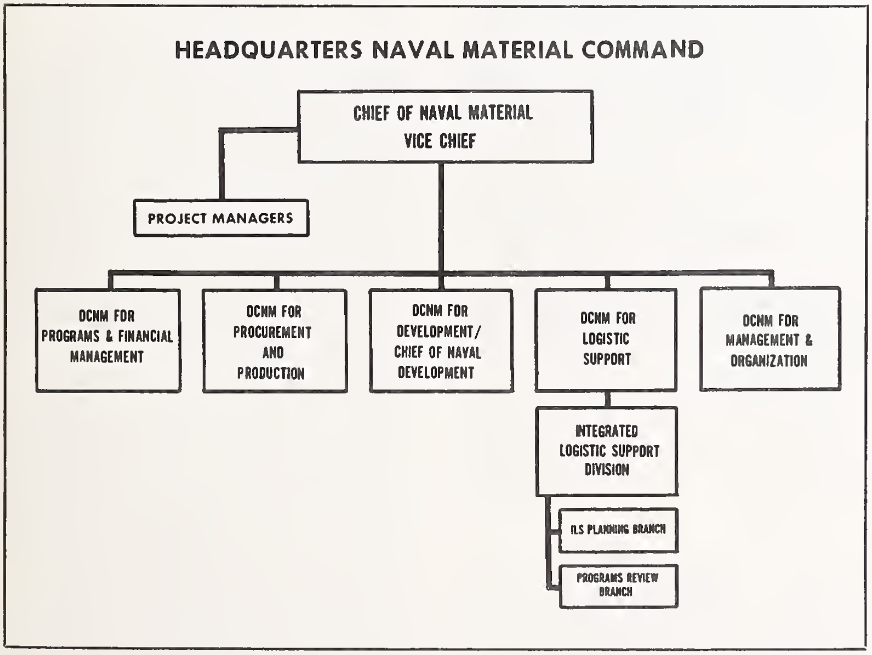

HEADQUARTERS NAVAL MATERIAL COMMAND
CHIEF OF NAVAL MATERIAL
VICE CHIEF
PROJECT MANAGERS
DCNM FOR PROGRAMS & FINANCIAL MANAGEMENT
DCNM FOR PROCUREMENT AND PRODUCTION
DCNM FOR DEVELOPMENT/ CHIEF OF NAVAL DEVELOPMENT
DCNM FOR LOGISTIC SUPPORT
DCNM FOR MANAGEMENT & ORGANIZATION
INTEGRATED LOGISTIC SUPPORT DIVISION
ILS PLANNING BRANCH
PROGRAMS REVIEW BRANCH

Figure 1

The future will bring extensive efforts not only to add more people for logistic planning functions, but more importantly to build within our present resources a cadre of trained, highly motivated acquisition logisticians who are proud to be members of a challenging and respected professional group.

Scope of Applicability

Although ILS is generally related to major weapon system and equipment acquisitions, the Navy regards the principles of ILS as valid regardless of the size of the acquisition, and intends ultimately to utilize them as appropriate in all system and equipment acquisitions. However, we view ILS implementation as an evolutionary process that will take from five to eight years to complete down to the level of the smaller acquisitions.

Here again the Navy has a long-term ideal, but we are trying to act decisively with practical short-term efforts which are intended to produce rapid and visible ILS planning, as well as leading us toward our ultimate goal.

We in the Navy must communicate with industry in terms of contract specifications. Industry will soon begin to see this communication. The next 24 months will see a major increase in the number of Navy contracts with stated ILS requirements. Since July 1966, we have placed specific requirements for ILS in early planning documents (such as Technical Development Plans) for over 400 acquisitions, covering a broad range of equipment types. As these acquisitions progress through the contract stage, industry will be faced with the need to respond to specified ILS requirements.

Policy and Procedures

The Navy has handled ILS policy and procedures in two formal directives: SECNAV Instruction 4000.29, which establishes Navy Policy in line with DOD Directive 4100.35; and NAVMAT Instruction 4000.20, which governs logistic support planning actions commencing with concept formulation, and establishes certain minimal requirements relative to the organization of the project or unit responsible for the acquisition. The latter directive also describes the support planning activity which must be accomplished during each phase of the acquisition.

Little need is foreseen for major changes to the ILS policy. However, as we gain experience in actual application, the procedures of NAVMAT Instruction 4000.20 will undoubtedly need revision.

Specifications

The most formidable immediate obstacle in fully embracing ILS relates to contract specifications. No one really disputes that ILS holds forth an intuitively valid promise of improve fleet support. However, it is obvious that without good workable specifications, ILS will never achieve its potential.

Fortunately, the Navy has had prior experience with one broad ILS specifications, known as WR–30, which has been successfully applied in a number of aircraft acquisitions. This specification is now being revised, and others are being developed by the Systems Commands to fit the specific needs of varied types of acquisitions. Our staff in the Naval Material Command is charged with the responsibility for reviewing and approving these specifications. We will, of course, solicit review and comment from industry.

The large number of acquisitions, which will move forward with ILS requirements during the next two years, will quickly reveal how well we have done the job of expressing the contribution expected from industry. As soon as the limits of any specification deficiencies are defined by negotiations, we will mount an all-out effort to resolve the problem. At present, we see a period of approximately three years before the major specifications can be firmed up and proven.

Test and Demonstration

Following specification development and personnel considerations in our priority list is the perfection of test and demonstration methods which will measure, prior to introduction in the Fleet, the adequacy of the logistic support package to be furnished with each new weapon system. Such tests are now required for each acquisition, and we expect to place more emphasis on this area in the future.

The Navy is committed to integrated logistic support for every weapon system and equipment we acquire. We have come a long way in the last two years, mostly with internal developments. Now we are becoming progressively more involved in Navy/industry ILS dialogues, and we have every expectation that such exchanges will prove fruitful in establishing integrated logistic support as a way of life in weapon system acquisition and life-cycle management.

Report on Defense—Related Statistics Available

This issue of the *Defense Industry Bulletin* will be the last to carry the report Selected Defense Department Economic Indicators (appearing on page 37 in this issue). The data will be included in a new, more comprehensive report, Defense Indicators, compiled by the Bureau of the Census. Data will be furnished by the Defense Department, Bureau of Labor Statistics, Bureau of the Census, the Treasury Department, and the Office of Business Economics.

Approximately 30 time series are included in the new report, grouped according to the time at which the activities which they measure occur in the defense order-production-delivery process.

A complimentary copy of the Defense Indicators is available from the Chief, Statistical Analysis Division, Bureau of the Census, Washington, D.C. 20233.

Defense Indicators is available by subscription for $4.50 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Foundations for the Future

(*Continued from Page 5*)

for today and tomorrow tend to be costly and complex—in many instances, more costly and complex than the systems they produce. An example is the space suit. To test a comparatively inexpensive space suit, we must have environmental chamber capable of simulating the conditions encountered in space.

This is perhaps one of the penalties of our technological success. But maybe we should quit looking at facilities as "penalties" and view them as "opportunities"—as the springboard to new generations of progress.

In any event, we cannot evade or avoid, in the years just ahead, the challenges of exploding progress in compressed periods of time. Lead times will become still shorter; the time for preparedness ever briefer.

Early, productive planning for the design, construction and use of aerospace test facilities will help offset these shrinking lead times. The converse, of course, is also true.

National technical resources of the stature of today's ranges, wind tunnels, and environmental chambers do not come easily or automatically. We must keep their potentials always before us. Otherwise, in this age of technological plenty, we may find ourselves suffering from an "Achilles heel," with the ideas, the technologies, and the needs clearly apparent but without the means to prove or disprove our technical theories.

In AFSC we have reaffirmed during the past year the competence of the government-industry partnership team to respond to the needs of our combat forces in Southeast Asia, to respond to the continuing challenge of maintaining a credible strategic deterrent, and to be responsive to the requirements for sound management practices in these days of limited resources.

Now we must also pledge our joint support to the growth of those national facilities which represent our foundations for the future. Nothing less than our national technical competence depends on the decisions and the developments to be made in these directions in the next several years.

Preparedness is our mutual concern. It must also be our common mission.

MEETINGS AND SYMPOSIA

AUGUST

Physiological Basis for Human Work Performance Symposium, Aug. 24, at Boston University. Sponsors: Army Research Institute of Environmental Medicine, Boston University and the American College of Sports Medicine. Contact: Dr. Ralph F. Goldman, Dir., Military Ergonomics Laboratory, Army Research Institute of Environmental Medicine, Natick, Mass. 01760.

Physiological Sciences Twenty-Fourth International Congress, Aug. 25-30, in Washington, D. C. Sponsor: Office of Aerospace Research. Contact: Dr. Harvey Savely, Air Force Office of Scientific Research (SRL), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OXford 4-5041.

Fifth International Congress on **Photobiology**, Aug. 26-31, at Dartmouth College, Hanover, N. H. Sponsor: Air Force Office of Aerospace Research. Contact: Dr. R. B. Stevens, National Research Council, 2101 Constitution Ave., N.W., Washington, D. C. 20428. Phone (202) 961-1200.

SEPTEMBER

Fifteenth Technical Meeting of the AGARD Avionics Panel on **Techniques for Data Handling in Tactical Systems**, (dates undetermined), at Amsterdam, Netherlands. Co-sponsors: AGARD and NATO. Contact: Dr. Irving J. Gabelman, Program Chairman, Advanced Studies Group, Rome Air Development Center (EMD), Griffiss AFB, N. Y. 13440, Phone (315) 330-7208.

International Conference on **Temperature and Cold**, Sept. 2-6, at Aspen, Colo. Sponsor: Air Force Office of Aerospace Research. Contact: Dr. Harvey Savely, Air Force Office of Scientific Research (SRL), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OXford 4-5041.

International Conference on **Light Scattering in Solids**, Sept. 3-6, at New York University. Sponsor: Army Research Office—Durham. Contact: Dr. Charles Boghosian, Physics Div., Army Research Office—Durham, Box CM, Duke Station, Durham, N. C. 27706, Phone (919) 286-2285, Ext. 34.

Third Annual Convention of the Society of **Logistics Engineers**, Sept. 5-6, at the Ambassador Hotel, Los Angeles, Calif. Sponsor: Society of Logistics Engineers. Contact: G. F. Fairhurst, Convention Chairman, Society of Logistics Engineers, P.O. Box 14778, Long Beach, Calif. 90814.

Solid Mechanics Symposium, Sept. 10-11, at Baltimore, Md. Sponsor: Materials Advisory Group of the Army Materiel Command. Contact: Joseph L. Bluhm, Technical Working Group on Materials, Army Materials and Mechanics Research Center, Watertown, Mass. 02173, Phone (617) 926-1900.

Tenth Annual Meeting of the **Military Testing** Association, Sept. 16-20, at San Antonio, Tex. Co-Sponsors: Military Testing Association and Aerospace Medical Div., Personnel Research Laboratory. Contact: Mr. Fotis, Aerospace Medical Div., Personnel Research Laboratory, Lackland AFB, Tex. 78236, Phone (512) 674-3211, Ext. 3964.

Advanced Planning Briefing for Industry on **Naval Ordnance/Missiles**, Sept. 18-19, at Coronado, Calif. (Classified Secret.) Co-Sponsors: Naval Material Command and the American Ordnance Association. Contact: Cdr. A. D. Sullivan, USN (Ret.), American Ordnance Association. 17th & H Streets, N.W., Washington, D. C. 20006, Phone (202) 347-7250.

Aerodynamic Deceleration Systems Conference, Sept. 23-25, at El Centro, Calif. Co-Sponsors: Defense Department Joint Parachute Test Facility and the American Institute of Aeronautics and Astronautics. Contact: Earl C. Myers, 6511th Test Group Parachute, Naval Air Facility, El Centro, Calif. 92243, Phone (714) 352-6642.

OCTOBER

Government **Microcircuit Applications** Conference, Oct. 1-3, in Washington, D. C. (Classified Secret). Sponsors: Defense Department, NASA, Department of Commerce, National Bureau of Standards, Post Office Department and other government agencies. Contact: Mr. A. E. Cook, Office of Naval Research, Code 403C, Washington, D. C. 20360.

Twelfth Annual **Organic Chemistry** Conference, Oct. 8-9, at Natick, Mass. Co-sponsors: Army Natick Laboratories and NAS-NRC Advisory Board on Military Personnel Supplies. Contact: Dr. L. Long Jr., Head, Organic Chemistry Group, PRL, U.S. Army Natick Laboratories, Natick, Mass. 01760, Phone (617) 653-1000, Ext. 2414.

Eighth Annual National Conference on **Environmental Effects on Aircraft and Propulsion Systems**, Oct. 8-10, at the Holiday Inn, Bordentown, N. J. Sponsor: Naval Air Propulsion Test Center. Contact: Mr. J. L. Palcza, Naval Air Propulsion Test Center, P.O. Box 176, Trenton, N. J., 08601 Phone (609) 882-1414, Ext 317.

Matrix Methods in Structural Mechanics Conference, Oct. 15–17, at Wright-Patterson AFB, Ohio. Co-sponsors: Air Force Flight Dynamics Laboratory and the Air Force Institute of Technology. Contact: Mr. Berke, Air Force Flight Dynamics Laboratory, (FDTR), Wright-Patterson AFB, Ohio 45433, Phone (513) 257–1110, Ext. 55651.

Silicon Carbide Second International Meeting, Oct. 21–23, at Pennsylvania State University. Sponsors: Air Force Cambridge Research Laboratories, Pennsylvania State University and the Carborundum Co. Contact: Mr. C. E. Ryan, Air Force Cambridge Research Laboratories (CRWF), L. G. Hanscom Field, Mass. 01730, Phone (617) 274–6100, Ext. 2234.

Explosive Chemical Reactions Seminar, Oct. 21–23 at Durham, N.C. Sponsors: Army Research Office, Air Force Systems Command and the Naval Ordnance Laboratory. Contact: James Norman, Dir., Research-Technology Div., Army Research Office, Box CM, Duke Station, Durham, N.C. 27706, Phone (919) 286–2285, Ext. 22 or 44.

Prime Contracting Program of Small Business Administration

Clyde Bothmer

[Editor's Note: This is the second in a series of articles about defense contracting for small business by Clyde Bothmer, Deputy Associate Administrator of the Small Business Administration.]

In recent years the increase in the technological complexity of material procured by the Defense Department, and the procurement policy of acquiring systems from a single contractor responsible for a total package, have combined to place many proposed acquisitions beyond the capabilities of small businesses. There are, however, many instances where small firms interested in becoming government prime contractors can perform the services desired by the Government. The Small Business Administration (SBA) takes active interest in assisting small businessmen to increase the number of contracts available to small business.

Three principle efforts contribute to the aid which SBA offers in the prime contracting field: the "set-aside," the "break-out," and the Certificate of Competency.

The set-aside effort is the specific identification of certain required material or services to be provided only by firms which qualify as small businesses. Some form of this approach has been utilized since the establishment of the Small Business Administration. Prior to July 1965, SBA representatives participated actively with the Defense Department personnel in reviewing acquisitions for possible set-asides. At that time, SBA shifted from active participation to the policy of surveillance. SBA personnel reviewed overall procurement policy and figures regarding set-asides, but were not involved in individual cases.

Unfortunately, the use of surveillance alone did not prove adequate to the needs of the SBA mission. Inquiry by the cognizant Congressional committees resulted in a study to determine whether the joint nature of the set-aside program should be reinstated. A steering committee, including representatives from the Defense Department, the National Aeronautics and Space Administration, the Bureau of the Budget, and the Small Business Administration, was established in September 1966 to conduct the study.

On February 21, 1967, the steering committee recommended to the Director of the Bureau of the Budget and the Administrator of the Small Business Administration that SBA develop, in cooperation with various procurement agencies, a set-aside program which would incorporate the best features of the unilateral (procurement agencies responsible for initiation of all set-asides), joint (procurement agencies and SBA sharing the responsibility for initiation of all set-asides), and surveillance procedures.

The recommendation also stated that a new approach should provide for the performance of the following functions by SBA:

- Exercise the set-aside function only on those procurements not unilaterally set aside by the procuring agency.
- Appeal to the Secretary or head of the procuring agency in cases where agency representatives do not concur in a set-aside suggested by SBA.
- Make periodic surveillance reviews of procuring activities.
- Provide for set-aside reporting under a unified system not differentiating between unilateral and joint set-asides.
- Perform additional functions such as recommending "break-outs," locating additional small business suppliers, and recommending modification of unduly restrictive specifications.

Lack of personnel prevented full implementation of these recommendations immediately. However, SBA did begin active participation with Defense Department personnel in the set-aside program, utilizing those individuals previously committed to the surveillance effort, and began planning for the necessary additional staffing to properly carry out the recommendations.

It is intended that the primary responsibility will fall upon approximately 42 Procurement Center Representatives assigned to various Defense Department installations throughout the United States. The installations to which they will be assigned have been chosen for the greatest possible impact on small business contracting. Factors considered in the selection were: dollar amounts of installation procurements, type of item services purchased, and estimated potential for small business.

The individuals filling these positions as SBA representatives will have extensive and varied responsibilities. Their basic function is to find ways to increase the amount of business which small firms may do with government agencies. In order to fulfill this obligation, they must respond to a variety of demands upon their time. To maintain the set-aside program, the representative must review procurement actions which have not been set aside by the agency unilaterally and make recommendations for joint set-asides. He must screen abstracts of bids, proposals and award data to determine if the maximum set-aside is being attained, and make appropriate recommendations to the procuring agency. In support of other SBA purposes, he must also try to discover small business bidders for procurements with inadequate small business competition, as well as keeping close watch on the Certificate of Competency program to ensure its application, when appropriate. Further, as SBA's "man-on-the-spot," the Procurement Center Representative is expected to evaluate the procurement operations and procedures of the installation in order to determine the effect on small business, and to maintain an awareness of procurement plans of the agency and recommend changes which will be helpful to small business. While the job is demanding, the burden is not so great as it may initially appear, *i.e.*, impossible. The representative is supported by the resources of the Regional and Area SBA Offices, as well as the efforts of the Central Office in Washington, D.C., and he maintains contact with those offices.

There are two collateral duties which are important to the prime contracting program. Specifically, the representative is expected to counsel small businesses on request, at least to the point of ensuring that appropriate aid is provided by the Regional Office. He is also expected to call SBA's attention to small businesses which are in danger of default on a contract, so that help may be offered in time to prevent that occurrence.

The latter point is of increasing interest to SBA, since the award of a set-aside to a small businessman is of negative value if the contract is not fulfilled; both the Government and the businessman are losers. Although this is not a critical problem in terms of frequency of occurrence, the nature of the issue makes it significant. Therefore, SBA intends to assign representatives to some Defense Contract Administration Services Regional Offices. These individuals will provide advice to small businessmen on matters of performance, inspection and acceptance of material, accounting for government property, security clearance of facilities, reporting and payments. The representatives will be increasingly valuable in locating firms which are experiencing difficulty in fulfilling contracts. It is also planned that they will participate in a study to determine principal contract administration problems faced by small business. Later, this study will serve as a basis for SBA recommendations of changes in policy and procedure, which will make this aspect of government contracting less burdensome on small concerns.

The second factor in SBA's contract assistance efforts is the utilization of so-called "break-out" which is a continual function for personnel in procuring agencies and the Small Business Administration. This slang expression has three connotations. First, the term may mean separation of specific services or material from a more general contract, *e.g.*, janitorial services might be broken-out of a general contract for housekeeping services on a missile installation. The second interpretation of break-out is the reduction of a single large procurement to several procurements in quantities which are within the capabilities of small businesses, *e.g.*, while the single procurement action for 1,000 small boats might be beyond capacity of small firms, the procurement might be broken-out into two lots of 300 and one lot of 400. The third type of break-out is separation of sub-systems or components from a system which is to be acquired, *e.g.*, the radar might be broken-out of an aircraft system. The contract for such equipment or components is awarded on a prime contract basis and material is then furnished to the total-system contractor as government-furnished equipment. This technique not only makes additional prime contracts available to small business but may also make possible government savings by eliminating payment of profit to both prime and subcontractors on items which will be subcontracted, and/or forcing prices down by the medium of increased competition.

A third phase of the SBA prime contracting assistance effort revolves around the Certificates of Competency Program (COC). If a contracting officer proposes to reject the bid of a small business firm which is a low bidder because he questions the firm's ability to perform the contract on the grounds of capacity or credit, the case is referred to SBA. As required by the Armed Services Procurement Regulation (ASPR), SBA personnel then contact the company concerned to inform it of the impending decision, and to offer an opportunity to apply to SBA for a COC which, if granted, would require award of contract to the firm in accordance with the Small Business Act.

The COC Program is carried out by a specialized SBA field staff of individuals with technical engineering backgrounds in cooperation with financial specialists, also of the field organization. On receipt of a COC application, the contracting officer of the procuring agency is notified that the potential contractor has applied, and a team of financial and technical personnel is sent to the firm to survey its potential. Although SBA has access to the pre-award survey conducted by the Defense Department, which serves as the basis of the contracting officer's decision, a completely new survey is conducted, evaluating the financial and technical characteristics of the applicant in terms of the needs of the specific procurement in question. Credit ratings, past performance, management capabilities, management schedules, and the prospects for obtaining needed financial help or equipment are all considered.

If the financial position of the firm is weak, if critical equipment is absent, or if the management effort is inadequate, the regular assistance programs of SBA (loans, management counseling, assistance in locating equipment, etc.) may be applied to strengthen capability. If it appears that the firm has the credit and productive capacity required to fulfill the contract, with or without SBA assistance, the team's findings will be presented to a COC Review Committee in the appropriate Area Office. The committee, composed of legal, technical and financial representatives, under the chairmanship of the Area Coordinator for Procurement and Management Assistance, makes its recommendation to the chairman after a detailed review of the case. The chairman, in turn, makes his recommendation to the Area Administrator.

If the decision here is negative,

the COC is denied and both the firm and the procuring activity are notified. If the decision is affirmative and the procurement is less than $250,000, the Area Administrator issues a COC. For procurements in excess of that amount, the recommendation and supporting data are forwarded to Washington, D. C., where the Central Office COC Review Committee, also composed of legal, technical, and financial representatives, considers the case and makes a recommendation to the Associate Administrator for Procurement and Management Assistance. If the Associate Administrator's decision is negative, the firm and the procuring activity are so informed; if affirmative, a letter, certifying the competency of the firm as to the capacity and credit to perform the subject contract (the Certificate of Competency), is sent to the procuring activity. By terms of the Small Business Act and ASPR 1–705.4, the COC is conclusive on questions of capacity and credit, and the contract is awarded.

Frequently the process described in the foregoing is terminated before completion, because SBA makes new information available to the contracting officer which persuades him to reverse his decision and award the contract without a COC.

After a COC is awarded and the contract is let to the applicant, SBA keeps a close watch on progress. Monthly checks are made by SBA field personnel who report directly to the Central Office on the status of the contract. In this way SBA assistance is constantly available to the contractor.

A COC is valid only for the specific contract for which it is issued. A business concern which is capable of handling one contract may not be qualified to handle another. Each case is considered separately; and each case is considered only if and after the contracting officer has made a negative determination of capacity and credit. Firms may not apply before a determination on bid acceptance is made by the contracting officer, nor may firms apply which are disqualified for reasons other than capacity or credit.

If the procedures described herein seem circuitous, two facts should be borne in mind: a final decision must be reached by SBA within 15 working days of the original referral, and the potential damage to both the businessman and the Government is large. Granting a COC carelessly to an overoptimistic businessman could lead him into bankruptcy, delay important government procurements, and waste the taxpayers' money. By utilizing such care, however, the default ratio on COC awards compares favorably with those of procuring agencies on normally awarded contracts.

From 1954 through 1967, there were 1,947 contracts awarded on the basis of a COC, with a dollar value of $369,290,000. The difference between the award prices of these contracts and the second lowest bid prices represents a savings to the Government of $29,835,000.

In addition to the efforts which have been described, SBA carried on various projects directed to the same goals but requiring less manpower. For example, although dominance of procurement dollars by the Defense Department makes it necessary to concentrate manpower on DOD acquisitions, civilian agencies are not neglected. Civilian procurement centers are covered by SBA representatives and the liaison officer to civilian agencies is working with headquarters of some departments to set small business award and unilateral set-aside goals. Such procedures have been implemented at the Department of Commerce, and negotiations are proceeding with other agencies.

Another useful tool in helping small businesses to obtain government contracts is the "U.S. Government Purchasing and Sales Directory" which is compiled in the SBA Central Office, and will be available in revised version soon. SBA field offices also provide valuable assistance in the prime contracting program as a part of their routine management assistance efforts, *e.g.*, counseling on selling to the Government, and seeking out small firms which can offer competition on sole source or limited competition items.

While all of the effort described herein is directed toward maximizing the contract opportunities for small firms, it must be remembered that the business must still be obtained on a competitive basis. Competition on set-asides assures that the Government obtains fair value; and the COC Program is open only to low bidders. There are no give-aways to the ineffective or unproductive. SBA can help to open up opportunities but success in small business, as in large business, goes to those who earn it.

Hubbell Report

(*Continued from page 13*)

variable special pays be studied further.

Normal reenlistment bonus would be discontinued. Variable reenlistment bonus would be tied to the salary, rather than to base pay, as at present. Separation pay would also be tied to the annual salary.

Detailed recommendations on the military estate plan, retirement, insurance, social security, dependents indemnity and compensation will be made in the second part of the study, still to be finished and released.

Cost Effectiveness

The net cost to the Government of the recommendations would be $460.4 million. This includes the increases in pay costs due to raising salaries to parity with Civil Service and the "save pay" policy that would prevent anyone from suffering a reduction in pay because of realignments within the structure. The total cost of the recommendations would be reduced by increased taxes, increased income from medical facilities, reduced operating costs of commissaries and exchanges, and elimination of reenlistment bonuses.

Greater visibility of income and increases to parity should increase retention and, thereby, reduce accession and training costs. The best estimates of training cost savings during the first year are $160.2 million for enlisted men and $29 million for officers.

Implementation of these proposals will at last allow members of the uniformed Services to compare their wages with those of their civilian cohorts. Military compensation would be brought in line with wages in other parts of the Federal Government and, through them, with the private sector.

In their letter transmitting the report to the Secretary of Defense, the members of the Military Compensation Policy Board said that the recommendations provide ". . . fairness and equity to the military individual, the Government, and the taxpayer; and should assist in attracting, retaining and motivating into the career force the kinds and numbers of personnel the uniformed services need."

BIBLIOGRAPHY

DEFENSE PROCUREMENT CIRCULARS

Distribution of Defense Procurement Circulars is made automatically by the U. S. Government Printing Office to subscribers of the Armed Services Procurement Regulation (ASPR).

Defense Procurement Circular No. 61, June 10, 1968. (1) Use of Government-Owned Industrial Plant Equipment by Contractors. (2) Procurement of Equipment under $1,000 for Privately-Owned Contractor Plants. (3) Contractor Statement of Inability or Unwillingness To Provide Industrial Facilities. (4) Responsibility for Detection and Reporting of Overpricing.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Guide to Contractor Performance Evaluation (Development and Production). Includes administrative procedures governing the preparation, processing and use of Contractor Performance Evaluation Reports. 50¢

Joint Packaging Manual (Vol. II). Provides uniform technical guidance to all of the military services and the Defense Supply Agency. 365 p. D7.6/8:4145.2 (Vol. II). $2.

Procedures for Submission of Applications To Be Placed on Research and Development Bidders Mailing List (ASPR Supplement 4). 35¢

Army Procurement Procedure, Change 6. Contains changes in the Army Procurement Procedure. 1967. D101.6/4:965/ch. 6. 60¢

MILSTRIP, Military Standard Requisitioning and Issue Procedures, Change 17. Contains changes in MILSTRIP procedures 1967. D7.6/4:M 59/ch. 17. 60¢

Changes to MILSTRIP, Military Assistance Program Address Directory, Supplement No. 2, Sept. 1, 1967.

Change No. 2, Nov. 1967. D7.6/4:M59/supp. 2/rev./ch. 2. $1.75

Change No. 3, Dec. 1967. D7.6/4:M59/supp. 2/rev./ch. 3. 20¢

Change No. 4, Jan. 1968. D7.6/4:M59/supp. 2/rev./ch. 4. 25¢

RESEARCH REPORTS

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Semiconductor Junction Properties as Influenced by Crystallographic Imperfections. I.B.M., for the Air Force, Aug. 1967, 170 p. Order No. AD–663 723.

Band Parameters Determination from Faraday Rotation Measurements. Laboratoire de Physique des Solides, Faculte des Sciences, Paris, France, for the Air Force, July 1967, 44 p. Order No. AD–664 582.

Annual Technical Report. M.I.T., Cambridge, Mass. for the Advanced Research Project Agency, Dec. 1967, 180 p. Order No. AD–663 181.

A High Precision System for Measuring Seebeck Coefficient, Electrical Resistivity, and Hall Coefficient in Inhomogeneous Thermoelectric Materials. Naval Radiological Defense Lab, San Francisco, Calif., May 1965, 47 p. Order No. AD–466 523.

Preliminary Investigation of Measurement of Elastic Moduli of Composites Using Strain Gages. University of Illinois, for the Navy, Sept. 1967, 23 p. Order No. AD–664 690.

A Report Guide to Radiographic Testing Literature, Vol. 1. Army Materials and Mechanics Research Center, Watertown, Mass., Dec. 1967, 106 p. Order No. AD–664 780.

Vortex Phenomena Study Continuation Program. Aerospace Research Center, Kearfott Group, Little Falls, N.J., for the Army, Dec. 1967, 206 p. Order No. AD–664 198.

Solution of the Laminar Boundary-Layer Equations with Mass Transfer by the GKD Multimoment Method. Aerospace Research Labs, Wright-Patterson AFB, Ohio, March 1967, 101 p. Order No. AD–664 591.

Results of 1967 Research on Conceptual Flutter Analyses, Final Report. McDonnell Douglas Corp., St. Louis, Mo., for the Navy, Dec. 1967, 107 p. Order No. AD–665 501.

Frequency-Error Indicator for Multiplex Teletype Signals. Naval Research Lab., Washington, D.C., Dec. 1967, 12 p. Order No. AD–664 654.

Word Statistics in the Generation of Semantic Tools for Information Systems. University of Pennsylvania, for the Air Force and Army, Dec. 1967, 94 p. Order No. AD–664 915.

U.S. Army Scientific & Technical Information Program FY 1966–1972. Army Research Office, Washington, D.C., Dec. 1966, 55 p. Order No. AD–664 785.

Improved Performance of Pulsed Noble Gas Ion Lasers with an Axial Magnetic Field. Aerospace Corp., El Segundo, Calif., for the Air Force, Nov. 1967, 13 p. Order No. AD–665 110.

Fluorescent Ion Interaction in Laser Crystals. Sperry Rand Research Center, Sudbury, Mass., for the Navy, Feb. 1968, 41 p. Order No. AD–665 033.

Guiding of Self-Focused Relativistic Electron Beams. Redstone Arsenal, Huntsville, Ala., Oct. 1967, 44 p. Order No. AD–664 135.

New Polymers to Protect Space Vehicles. Polytechnic Institute, Brooklyn, N.Y., for the Advanced Research Projects Agency, Oct. 1967, 28 p. Order No. AD–665 442.

The Role of Universities in Government-Financed Research and Development

Address by Hon. Alexander H. Flax, Asst. Secretary of the Air Force (Research & Development), before the Federal Bar Assn., New York, N. Y., May 24, 1968

I am pleased to have this opportunity to discuss with you the roles of universities in connection with Government-financed research and development. This subject might have been called the role of government financing in university research and development, but, as you will learn my thesis is that the former subject is much broader than the latter. In order to achieve some degree of understanding of this subject, it is necessary to explore the character of university contributions to the advance of science and technology in this nation, and to put this into the perspective of what has been happening in our society and our economy.

We are now well along in what has been called the Scientific Revolution. Whereas the older Industrial Revolution had its origins mainly in the empirical developmemt of the arts and crafts, the Scientific Revolution depends upon the organized and systematic pursuit of research and development. By systematic and organized pursuit of scientific research, I do not of course mean to imply that it is possible to schedule so-called "breakthroughs" in science and technology, although breakthrough is these days a much overworked word. However, I do mean that the overall rate of progress in given fields can, in major degree, be controlled by influencing the rate of allocation of material and human resources to given fields.

The universities play an important, and sometimes not fully appreciated, part in making our diverse national system of research and development institutions work. They do this by a variety of formal and informal mechanisms. Directly supported research is the best known, and ranges from projects conducted by a single professor and his students to programs involving institutional support in a broad technical area, such as the tri-Service electronics research programs at several universities. Also a number of universities have assumed this responsibility for management of off-campus contract research centers of various kinds, including Federal Contract Research Centers. But these direct contributions, however important and necessary, constitute only a small part of the university role in the evolution and development of the national research and development program. The universities also contribute in a major way to the processes of communication and general education which make possible the smooth interaction of a diversity of institutions and organizations—government, industry, university and non-profit—which have together brought this country to its present position of leadership, not only in research and development, but in the utilization of technology. The universities are not only responsible for the output of highly competent scientists and engineers, schooled in the latest technical knowledge and techniques of a rapidly changing science and technology, who form the life blood of the research and development process, but the faculties, through their research publications and participation in government and in industry advisory boards and consulting activities, integrate, harmonize, and provide standards of quality for the research and development program of the nation as a whole.

It is often thought the universities should and largely do confine themselves to problems of basic research in pure science only. However, universities in this country also have the important mission of educating engineers—not just research engineers but men who will follow the profession in industry, government and private practice. Doctorates in engineering accounted for 20 percent of all doctorates in scientific fields and about 10 percent of all advanced degrees (masters and doctors) awarded by universities in 1966. The research interests of universities, therefore, range from the basic sciences on through to many problems in the field of application which lie on the frontiers of engineering. The latter class of problems often are of such a nature that, unlike many of the problems in research, the applications are apparent. In the DOD programming structure, these latter problems are categorized as exploratory and advanced development rather than as research. Therefore we find that universities are involved, not only in DOD research activites, but also in exploratory and advanced development. For example, in FY 1967, Air Force obligations for research in universities amounted to about $37 million, whereas obligations for exploratory and advanced development were about $53 million. Contracts in other research categories, including small amounts of effort funded under operational system development, brought the Air Force total for educational institutions in FY 1967 to $96 million. In addition, about $31 million were obligated for Federal Contract Research Centers administered by universities and colleges. For all Federal agencies, research and development at universities and colleges during FY 1967 totaled about $1.4 billion, with an additional $660 million for Federal Contract Research Centers administered by universities and colleges.

Most of the specialized attention within the Government to university research activities has been in relation to basic research programs, for which Federal obligation totaled over $2 billion in FY 1967; about 50 percent of this amount went to universities. The growth in Federal support for such basic research activities over the past 10 years is dramatic to say the least. From 1956 to 1966 funds for this purpose increased ten-fold. Contrary to what many believe, most of the growth in Federal support of basic research over the past 10 years has been in the programs of civil rather than military agencies. Paradoxically, whereas there has been some public airing of an alleged takeover of university research by the military, some of the research scientists have privately complained about what they describe to be a diminution of military interest and support of basic research. Many members of the scientific community have, thus, come to measure the government's interest in supporting research not on the basis of the level of effort, but on the rate of growth of this level. I am sure that it will not tax your mathematical powers to recall the laws of compound interest: this trend of growth in basic research funding, if it were to continue from the level of 1966 for 10 years, would result in a level of funding for basic research as large as the total national research and development budget today—some $20 billion.

Priorities in Basic Research

The scientific community has for a long time had a very comfortable philosophy for the growth of research. This philosophy was premised on the belief that all basic research is intrinsically a good thing, that it should be limited only by the availability of qualified people, and that the nation should support all of its people capable of basic research in such projects as the expanding vistas of science and technology opened up to us. However, I do not think that 20 years ago anybody appreciated the degree to which the government policies in support of this philosophy would lead to the recent rates of growth. Such growth has come about not only because more and more people were attracted to basic research as budgets and opportunities expanded, but also because, as we seek to explore ever more difficult and obscure areas, the cost of equipment and technical support for research similarly expands. And as the financial requirements for research grow and the needs of various fields come into competition with one another, we inevitably come to the question of how to establish priorities in basic research in our original various fields.

The question of assigning priorities in basic research in our original philosophy was presumed not to exist, but I submit that this was too naive a view of the world. The growth process in research is not self-regulating. The more research which is supported in a given area, the more graduate students will be trained and motivated in that area, thereby generating more promising research proposals in that area which, if considered sound, would inevitably be funded in accordance with our original philosophy and would, thereby, provide opportunities for the training of still more graduate students in that area. This process could, of course, go on *ad infinitum*. In the language of control engineering, the feedback loop is unstable. There are additional destabilizing feedback loops in the system. For example, the greater the funding of a given area, the greater the representation of influential scientists from that area on the government advisory groups recommending the allocation of research funds, and the more public attention and support the activities and accomplishments in that area are likely to draw. There is no doubt that corrective mechanisms can be and have been devised to stabilize the system, but the tendency to instability is always there to be reckoned with when the system is disturbed.

In this country, a substantial fraction of the basic research has been funded by mission-oriented agencies, such as the Defense Department, National Aeronautics and Space Administration, the Atomic Energy Commission, the Department of Health, Education, and Welfare, etc. Each mission-oriented agency seeks to stimulate research in those areas deemed most likely to relate to its interests. Looking over the entire field of science, and assuring that no promising area of research is overlooked merely because the vision of the mission-oriented agencies may be too short, is the National Science Foundation. This situation has been the subject of considerable public debate and it has at times been argued that all basic research, and indeed a good bit of research beyond the basic, should be the responsibility of a Federal Department of Science. This proposal has not received a great deal of support from the scientific community, but it has a certain appeal in light of the philosophy of research for its own sake, and a recent desire on the part of some to isolate scientific research in the academic environment from the problems of the nation or, at least, to be highly selective about those national problems they will choose to work on.

Hon. Alexander H. Flax

Research Costs Spiral

The drive toward full utilization of our scientific potential on the frontiers of knowledge has had the inevitable effect of raising the cost of research. In the recent past, distinguished scientific committees and panels at the national level have pointed out the need to increase funding for research in fundamental particle physics, radio astronomy, optical astronomy, chemistry and oceanography, among other fields. In most of these cases, a large investment in research facilities, research instrumentation and equipment is implied. The cost of equipment seems to be on an ever increasing upward spiral, advancing much more rapidly than the cost of scientists actually engaged in research. This is contagious, moving from the fields at the frontiers of science to those somewhat in the rear; even research in the humanities now is coming to require a high speed digital computer in many cases.

The policies of DOD, with respect to basic research in universities, are shaped by these considerations and the understanding which we have achieved of the conditions necessary to keep research in the academic environment healthy and productive. We do not attempt to direct basic research in the universities toward specific practical objectives. We do not issue requests for proposals for basic research on given projects and, although typically two to three times as many proposals for basic research are received as are funded, we do not make competitive evaluations in the usual sense of proposals that are received. Our control of basic research is through the choice of the fields in which research grants and contracts are awarded. Our choice of research investigators is almost entirely on the basis of their competence to perform research in these fields. In categories of research and development other than basic research, however, university proposals, whether solicited or unsolicited, are subjected to substantially the same tests as those from industry or other non-profit institutions.

DOD has no responsibility, and indeed no authority, to generally support or enhance education as such. Nevertheless, being fully cognizant of the workings of the mechanisms I have already described, we are aware of the impact which our university contract and grant programs may have of educational programs, partcularly at the graduate level. I believe that for the most part DOD and the other mission-oriented agencies of the Government have conducted their basic research programs with universities with a long-term outlook, giving broad consideration to the interaction between research and graduate education. Nevertheless, with the growing size of the Federal research program at universities and the recognition of the degree to which this program could influence the future of universities, there has been growing concern in the academic community and in the public lest there be some diminution in the independence and quality of university research and development programs.

President Johnson, on September 13, 1965, gave direction to all Federal agencies in a memorandum to Heads of Departments and Agencies on "Strengthening Academic Capability for Science Throughout the Country."

This memorandum included the following statement:

> **The strength of the research and development programs of the major agencies, and hence their ability to meet national needs, depends heavily upon the total strength of our university system. Research supported to further agency missions should be administered not only with a view to producing specific results, but also with a view to strengthening academic institutions and increasing the number of institutions capable of performing research of high quality.**

The President's memorandum also highlighted the need to build new centers of scientific excellence in our universities throughout the nation. The Defense Department responded by initiating Project THEMIS, with the objective of establishing new university research programs in scientific areas of interest to DOD. The objective of broadening both the institutional and geographical distribution of DOD research funds was clearly stated, and universities and colleges were informed that their current level of DOD research funding would be considered as a negative factor in evaluating their proposals. The appropriated funding levels for Project THEMIS are $19 million and $26 million for the FY 1967 and FY 1968, respectively, and the first increment of programs has already been initiated at 42 colleges and universities.

The Armed Services Procurement Regulation (ASPR) contains numerous provisions which recognize the special character of educational institutions. For example, such institutions may be furnished government facilities without charge or other consideration, may acquire surplus government property, and may receive payments in advance of cost incurrence without interest, pursuant to advance payment cost agreements; simplified method of accounting and reporting of professional time and effort are acceptable, as are simpler and more flexible property accountability procedures. The cost principles of ASPR XV, Part 3, which apply to universities are essentially those of Bureau of the Budget Circular A–21, and recognize the particular fiscal practices and activities of universities. On the other hand, the ASPR authorizes cost sharing in contracts with universities, a practice which is virtually forbidden for industrial contracts. Also universities, as distinct from their separately organized and managed research centers, generally receive no fee for their efforts and so must absorb any unallowable or disallowed costs in their general funds.

A major milestone in the DOD university research programs was attained in 1958, when Congress enacted a law permitting the use of grants for basic research. The grant is a simple instrument, devoid of most of the usual contract "boilerplate," requiring a minimum of bookkeeping and financial reporting, and permitting the grantee a high degree of flexibility in the performance of his research. Although grants were very attractive to university research scientists, many university administrators were soon disenchanted with them, first of all because of a Congressional mandate in the Defense Department Appropriations bill in FY 1963 limiting grant overhead to 20 percent. Subsequently, this was replaced by a requirement for cost sharing in grants which still applies. Nevertheless, although practices among government agencies vary, the Air Force still believes that the grant is often the best instrument for the support of basic research, and roughly half of the Air Force university basic research program is in the form of grants.

The major current problems of universities and colleges with government-financed research and development have to do more with their concerns about stability of funding, than with particular provisions of contract and grant agreements. University commitments to faculty, staff and graduate students almost always span periods of time greater than the usual DOD one-year budget cycle. This has been recognized for a long time and, to varying degrees, government agencies have attempted to provide university research funding for greater than a one-year period. For example, Project THEMIS is fully funded for the first year plus two-thirds of the second year and one-third of the third year. However, only a small part of the uni-

(*Continued on Page 26*)

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Maj. Gen. Thomas H. Scott Jr., USA, has been designated as Executive Dir., Supply Operations, Defense Supply Agency. He succeeds **RAdm. John W. Bottoms**, USN, whose next assignment will be as Commanding Officer, Naval Supply Center, Norfolk, Va.

Brig. Gen. Chester J. Butcher, USAF, has been assigned duty as Dep. Dir. for Concepts and Operational Readiness, Defense Communications Planning Group, Defense Communications Agency.

RAdm. Joseph L. Howard, (SC), USN, has succeeded **Maj. Gen. John A. Goshorn**, USA, as Dep. Dir., Defense Contract Administration Services, Defense Supply Agency.

Col. Albert J. Brown, USAF, has been assigned to the Defense Communications Agency as Chief of the Plans Div.

Capt. M. W. Harris, USN, has reported for duty to the Defense Electronics Supply Center, Dayton, Ohio, as Dir. of Production and Procurement.

Capt. Frank D. McMullen Jr., USN, has been designated as Dep. Asst. to the Secretary of Defense (Atomic Energy).

Col. Harold G. Wells Jr., USAF, has been named Dep. Commander, Eastern Region, Military Traffic Management and Terminal Service, Brooklyn, N.Y.

DEPARTMENT OF THE ARMY

Robert E. Jordan has been appointed General Counsel, Department of the Army. He has been serving as Acting General Counsel since September 1967.

Brig. Gen. Hugh F. Foster Jr., has been designated Dep. Commanding General for Systems Acquisition, Strategic Communications Command, Fort Huachuca, Ariz. Gen. Foster will also continue in his present job as Commanding General, Communications Systems Agency, Fort Monmouth, N.J.

Brig. Gen. Clarence C. Harvey Jr., Dep. Commanding General, Air Defense Systems, Army Missile Command, Redstone Arsenal, Ala., has retired from the Army after 30 years service.

Col. Harry C. Besancon has been named Chief of Staff, Army Weapons Command, Rock Island, Ill.

Col. Thomas N. Chavis has succeeded **Col. Francis J. Pallister** as Dir., Missiles and Space, Office of the Chief of Research and Development, Department of the Army.

Col. Clyde L. Friar has been ordered to Pine Bluff Arsenal, Ark., for duty as Commanding Officer.

Col. Leonard M. Orman succeeds **Brig. Gen. Chester H. Johnson** as Dep. Commander, Army Weapons Command, Rock Island, Ill.

Col. Chester C. Sargeant is the U.S. Army Test and Evaluation Command's new Systems Test Manager for the Main Battle Tank–70 Program at Aberdeen Proving Ground, Md. In another change at the Test and Evaluation Command, **Col. LeRoy S. Stanley** succeeded **Col. Robert B. Tully** as Dir., Infantry Materiel Testing.

Gen. **William C. Westmoreland**, USA, former commander, U.S. Military Assistance Command, Vietnam, was sworn in as The Chief of Staff, U.S. Army, on July 3 in Pentagon ceremonies. He succeeds **Gen. Harold K. Johnson**, USA, who retired. Gen. Westmoreland, 54, is a native of Spartanburg, S.C. He is a 1936 graduate of the U.S. Military Academy, West Point, N.Y. During his 32 years of service, Gen. Westmoreland has commanded the 101st Airborne Division and Ft. Campbell, Ky., and has been Superintendent of the U.S. Military Academy.

DEPARTMENT OF THE NAVY

RAdm. James C. Dempsey has succeeded **RAdm. Reynold D. Hogle** as Commandant, Fifth Naval Dist., Norfolk, Va. Adm. Hogle has retired after 43 years of Naval service.

RAdm. Spencer R. Smith has been named Dep. Commander for Management, Naval Facilities Engineering Command.

Capt. Andrew Bodnaruk has been assigned as Officer-in-Charge, Annapolis Div., Navy Ship Research and Development Center.

Capt. Arthur H. Cummings Jr. is the new Exec. Asst. and Naval Aide to the Asst. Secretary of the Navy (Research and Development).

Capt. Stanley T. Ebel has been assigned duty as Officer-in-Charge, San Diego Div., Navy Ship Engineering Center, San Diego.

Capt. Theodore R. Fick has taken command of the Navy Research and Development Laboratory, San Francisco, Calif.

Capt. William J. Maddocks is the new Commanding Officer, Navy Weapons Station, Yorktown, Va.

Capt. Charles N. Payne Jr. has relieved **RAdm. E. H. Batcheller** as Commander, Charleston Naval Shipyard, Charleston, S. C.

Capt. Robert H. St. Clair Jr. has assumed command of the Pacific Missile Range Facility Hawaiian Area. He relieved **Capt. Robert W. Rynd**, who has retired.

Capt. Thomas J. Christman, Commanding Officer, Naval Ammunition Depot, Crane, Ind., and **Capt. Douglas H. Lyness Jr.**, Commanding Officer, Navy Fleet Material Support Office, Mechanicsburg, Pa., have been selected for promotion to rear admiral.

DEPARTMENT OF THE AIR FORCE

Maj. Gen. Gordon M. Graham has succeeded **Lt. Gen. Albert P. Clark**, as Vice Commander, Tactical Air Command. Gen. Graham will be promoted to the rank of Lieutenant General with the assignment. Gen. Clark has been reassigned as Commander, Air University, Maxwell AFB, Ala.

Maj. Gen. Leo P. Dusard has been named Vice Commander, Air Training Command, Randolph AFB, Tex.

Brig. Gen. Walter E. Williams Jr., has been assigned as Vice Commander, Tactical Air Warfare Center, Eglin AFB, Fla.

The following assignments have been made at USAF Headquarters:

Maj. Gen. Glenn A. Kent, Asst. Chief of Staff (Studies & Analysis); **Brig. Gen. Maurice F. Casey**, Dir., Transportation, Office of Dep. Chief of Staff (Systems & Logistics); **Col. Harvey W. Eddy**, (brigadier general selectee), Dep. Dir., Development; **Col. Lee M. Paschall**, (brigadier general selectee), Dep. Dir., Command Control & Communications, Office of Dep. Chief of Staff (Programs & Resources); and **Col. Alfred C. Bigum**, Dep. Asst. for Research & Development Programming, Office of Dep. Chief of Staff (Research & Development).

The following assignments have been made in the Air Force Systems Command (AFSC):

Maj. Gen. Joseph J. Cody Jr., Commander, Electronic Systems Div., L. G. Hanscom Field, Mass.; **Maj. Gen. Paul T. Cooper**, Chief of Staff, AFSC Hq.; **Maj. Gen. Lee V. Gossick**, Vice Commander, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Brig. Gen. Louis L. Wilson, Jr.**, Vice Commander, Space & Missile Systems Organization, Los Angeles, Calif.; **Brig. Gen. Felix M. Rogers**, Dep. Chief of Staff for Development Plans, AFSC Hq.; **Brig. Gen. Maurice A. Cristadoro**, Asst. Dep. Chief of Staff for Development Plans, AFSC Hq.; **Col. Alfred L. Esposito**, (brigadier general selectee), Asst. Dep. Systems Program Dir., F-111 Program, Aeronautical Systems Div.; **Col. James E. Paschall**, Vice Commander, Air Force Special Weapons Center, Kirtland AFB, N. M.; **Col. Alton D. Slay**, (Brigadier General Selectee), Vice Commander, Air Force Flight Test Center, Edwards AFB, Calif.; **Col. Charles T. Urquhart**, Asst. Dep. for Maintenance, Space & Missile Systems Organization; and **Lt. Col. Joseph A. Guthrie Jr.**, Chief, Test and Deployment, C-5 System Program Office, Aeronautical Systems Div.

The following assignments have been made in the Air Force Logistics Command (AFLC):

Maj. Gen. Abe J. Beck, Commander, Warner Robins Air Materiel Area, Robins AFB, Ga.; **Brig. Gen. William W. Snavely**, Dep. Commander, Oklahoma City Air Materiel Area, Tinker AFB, Okla.; **Col. Dean E. Hess**, Dir., Office of Information, AFLC Hq., Wright-Patterson AFB, Ohio; **Col. Jack K. Massie**, Vice Commander, 2802 Inertial Guidance/Calibration Group, Newark Air Force Station, Ohio; and **Col. Warner E. Newby**, (brigadier general selectee), Asst. Dep. Chief of Staff (Maintenance Engineering), AFLC Hq.

Charge Set on Hard Copy Tech Reports

The Defense Documentation Center (DDC) initiated a service charge for all hard copies of technical reports effective July 1, 1968.

Full text of all reports will continue to be available to all users in microform at no charge. In addition, all DDC services and products, except hard copies of technical reports, will continue to be provided at no charge.

The Department of Commerce's Clearinghouse for Federal Scientific and Technical Information is responsible for collecting and handling all financial transactions with DDC users. Both DDC and the Clearinghouse have disseminated detailed information directly to DDC users concerning the new policy.

Role of Universities in Government-Financed Research

(Continued from Page 24)

versity basic research program has this or similar forward funding, and virtually none of the exploratory and advanced development at universities has forward funding. Moreover, much university planning was based on the assumption that the Federal research funding growth rate of the last decade would continue indefinitely. However, at the $2 billion level, Federal funding of basic research is already in competition with other important national needs and wants. Not only is the need for a continuing high rate of growth being questioned by the public and in Congress, but also the necessity and desirability of current levels is being scrutinized. While the general notion that research is a good thing is not being questioned, it is being pointed out that there can be too much of a good thing.

From the standpoint of the Defense Department, there is no doubt that a continuing high level of activity and progress in fields of research relevant to military technology is essential to assure our national security. There are vast areas of advancing science and technology which must be explored and watched, not only to identify military opportunities for ourselves and our allies but also to guard against technological surprise from our potential enemies. I believe that this is clearly indicated by the history of the past 50 years. It would take too long here to address the non-military benefits of an aggressive national basic research program, but it can be safely said that they, too, are considerable. And to assure the continuing health of our science and technology in the long term, we must assure the continuing vitality of scientific research in our universities. Those of us charged with responsibility for the research and development programs of the Defense Department have been virtually unanimous in asserting these convictions in the councils of the Federal Government and in our appearances before the Congress.

It is difficult to predict what will be the future course of science and technology, and what changes will take place in our society, our economy, and our international posture as a result. Certainly it is apparent that we have much to learn about how to meet the rapid changes in our environment which science and technology can bring about. But we can be sure that the universities will continue to have a vital role, not only in our scientific and technological progress, but in helping us to learn to live with that progress and shaping it to our ends.

STATUS OF FUNDS

DEPARTMENT OF DEFENSE

Military Functions and Military Assistance Program

Quarterly Report

Prepared by:

Directorate for Financial Analysis and Control
Office of the Assistant Secretary of Defense (Comptroller)
Room 3C 839, The Pentagon, Phone: (202) OXford 7-2332

NOTE: All expenditure amounts are on a net Treasury basis (gross payments less reimbursement collections), whereas obligations and unpaid obligations are on a gross basis (inclusive of reimbursable activity performed by components of DOD for each other). Therefore, unpaid obligations as of the end of the reporting month cannot be computed from other figures in this report.

Expenditures

Third Quarter, Fiscal Year 1968

(Amounts in Thousands)

DEPARTMENT OF DEFENSE

	Expenditures				Unpaid obligations	
	Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	At start of year	As of Mar. 31, 1968
Military Personnel						
Active forces	1,675,758	1,525,726	1,517,796	13,681,915	850,076	1,238,606
Reserve forces	48,948	50,052	53,639	651,596	149,863	118,295
Retired pay	174,953	175,406	176,509	1,537,297	7,622	6,620
Undistributed	−36,296	−35,690	−30,266	−22,579	—	22,579
Total—Military Personnel	1,863,363	1,715,494	1,717,679	15,847,331,	1,007,561	1,386,098
Operation and Maintenance	1,687,111	1,557,146	1,698,107	14,886,759	[a] 3,542,486	3,588,957
Procurement						
Aircraft	872,262	841,871	712,149	7,179,232	[a] 9,317,974	8,260,081
Missiles	221,358	184,723	203,411	1,633,542	1,929,015	2,091,706
Ships	119,704	87,504	105,011	1,118,053	3,049,781	3,009,229
Tracked combat vehicles	38,497	42,686	39,092	342,171	632,680	557,190
Ordnance, vehicles, and related equipment	641,551	581,203	377,205	4,401,242	6,721,730	7,090,498
Electronics and communications	165,851	163,801	128,959	1,125,559	1,998,176	1,768,265
Other procurement	231,211	192,996	240,632	1,669,051	1,947,502	1,802,526
Undistributed	−16,575	−181,540	−126,942	55,939	−386,056	−452,702
Total—Procurement	2,273,863	1,913,242	1,679,517	17,524,791	25,210,802	24,126,793
Research, Development, Test, and Evaluation						
Military sciences	93,341	93,370	80,642	766,781	867,381	776,515
Aircraft	71,664	99,500	94,250	860,313	796,125	921,943
Missiles	205,150	207,150	206,010	1,914,673	1,095,907	1,231,080
Astronautics	72,727	82,268	117,063	895,232	649,793	534,206
Ships	25,443	22,916	20,384	225,709	212,773	215,061
Ordnance, vehicles, and related equipment	29,237	24,299	28,508	261,790	235,442	228,529
Other equipment	78,231	47,687	63,533	573,548	541,757	502,088
Program-wide management and support	38,558	37,504	47,253	354,785	163,038	143,294
Undistributed	−33,946	−44,399	−31,795	−12,747	−194,032	−182,757
Total—Research, Development, Test, & Eval.	580,407	570,294	625,886	5,840,086	4,368,185	4,369,960
Military Construction	123,610	105,058	90,178	968,807	1,581,256	1,409,375
Family Housing	44,682	6,330	46,045	369,814	114,964	205,458
Civil Defense	8,161	11,905	10,312	80,653	91,893	77,648
Other—Special Foreign Currency Program	39	265	1	1,215	2,193	1,146
Revolving and Management Funds	323,721	299,178	209,515	985,321	527,834	323,778
Subtotal—Military Functions	6,904,956	6,178,914	6,077,237	56,504,776	36,447,172	35,489,217
Military Assistance	72,474	38,683	44,165	374,117	2,112,357	1,654,786
TOTAL—DEPARTMENT OF DEFENSE	6,977,430	6,217,597	6,121,403	56,878,894	38,559,529	37,144,003

[a] Differs from amounts reported June 30, 1967, due to reclassification of Aircraft and Related Procurement, Navy from "Procurement" to "Operation and Maintenance." Amount $37,300,000.

NOTE: Detail may not add to rounded totals.

	Expenditures				Unpaid obligations	
	Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	At start of year	As of Mar. 31, 1968
Military Personnel						
Active forces	688,854	604,539	585,102	5,405,836	392,872	652,170
Reserve forces	29,915	26,080	30,782	424,638	112,152	86,606
Undistributed	−19,774	−53,606	−24,980	−38,481	—	38,481
Total—Military Personnel	698,995	577,013	596,904	5,791,993	505,024	777,257
Operation and Maintenance	722,641	628,339	644,381	5,756,176	1,252,029	1,203,619
Procurement						
Aircraft	82,567	100,297	83,942	823,493	1,303,735	995,927
Missiles	34,784	30,839	41,489	269,344	458,264	645,024
Tracked combat vehicles	38,069	42,448	38,752	339,777	611,133	533,765
Ordnance, vehicles, and related equipment	279,921	336,168	235,819	2,024,730	3,387,912	3,382,886
Electronics and communications	55,384	82,590	51,489	430,627	780,554	661,594
Other procurement	70,355	81,840	76,600	573,761	817,300	655,124
Undistributed	−8,324	−175,306	−131,916	37,949	−386,056	−431,929
Total—Procurement	552,757	498,876	396,174	4,499,681	6,972,842	6,442,390
Research, Development, Test, and Evaluation						
Military sciences	15,429	14,914	13,953	118,796	133,665	114,289
Aircraft	9,357	9,851	6,996	106,548	85,463	71,799
Missiles	55,906	65,037	57,094	507,728	435,876	518,694
Astronautics	1,577	1,011	1,624	14,290	15,069	8,652
Ordnance, vehicles, and related equipment	14,795	15,891	14,007	138,986	136,432	123,568
Other equipment	29,940	28,233	28,279	236,560	218,437	197,413
Program-wide management and support	7,840	6,383	6,378	61,872	39,835	42,044
Undistributed	−20,472	−45,887	−29,206	−7,985	−194,032	−187,519
Total—Research, Development, Test, & Eval.	114,372	95,433	99,305	1,176,795	870,745	888,940
Military Construction	68,781	47,059	26,679	517,737	818,076	671,271
Revolving and Management Funds	84,632	85,221	98,642	481,116	58,732	−27,431
TOTAL—DEPARTMENT OF THE ARMY	2,242,179	1,931,941	1,856,085	18,223,499	10,477,449	9,956,046

DEPARTMENT OF THE NAVY

	Expenditures				Unpaid obligations	
	Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	At start of year	As of Mar. 31, 1968
Military Personnel						
Active forces	511,116	463,976	444,905	4,065,892	232,405	271,364
Reserve forces	10,499	11,817	12,579	111,703	19,698	21,223
Undistributed	−15,692	1,188	9,517	15,037	—	−15,037
Total—Military Personnel	505,923	476,981	467,001	4,192,632	252,103	277,550
Operation and Maintenance	332,809	350,416	414,224	3,798,236	[a]1,234,696	1,327,192
Procurement						
Aircraft	286,824	274,828	286,084	2,431,008	[a]3,505,672	2,667,423
Missiles	71,583	27,806	37,809	335,360	470,557	532,337
Ships	119,704	87,504	105,011	1,118,503	3,049,781	3,009,229
Tracked combat vehicles	428	238	340	2,394	21,547	23,425
Ordnance, vehicles, and related equipment	198,446	138,645	75,293	1,162,272	1,611,746	1,886,223
Electronics and communications	56,488	42,206	45,058	367,420	656,337	589,790
Other procurement	87,346	70,206	132,473	664,305	921,116	998,562
Undistributed	−9,782	−4,808	4,809	12,911	—	−15,674
Total—Procurement	811,038	636,623	686,829	6,093,724	10,236,796	9,691,315
Research, Development, Test, and Evaluation						
Military sciences	15,266	12,617	11,691	149,030	127,323	112,704
Aircraft	22,596	33,588	30,303	251,259	260,838	224,916
Missiles	78,251	53,236	83,803	681,194	293,783	296,623
Astronautics	2,842	1,132	1,294	17,427	12,677	12,648
Ships	25,443	22,916	20,384	225,709	212,773	215,061
Ordnance, vehicles, and related equipment	14,442	8,408	14,501	122,804	99,010	104,961
Other equipment	21,705	9,769	11,009	99,916	89,328	80,610
Program-wide management and support	12,069	9,567	16,029	101,016	97,989	84,047
Undistributed	−13,499	−707	−300	−6,090	—	6,090
Total—Research, Development, Test, & Eval.	179,115	150,525	188,715	1,642,265	1,193,721	1,137,661
Military Construction	3,847	17,007	30,364	53,840	269,300	441,085
Revolving and Management Funds	201,343	233,394	183,595	379,981	462,849	387,374
TOTAL—DEPARTMENT OF THE NAVY	2,034,076	1,864,947	1,970,730	16,160,682	13,649,465	13,262,173

---

[a] Differs from amounts reported June 30, 1967, due to reclassification of Aircraft and Related Procurement, Navy from "Procurement" to "Operation and Maintenance." Amount $37,300,000.

DEPARTMENT OF THE AIR FORCE

	Expenditures				Unpaid obligations	
	Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	At start of year	As of Mar. 31, 1968
Military Personnel						
Active forces	475,788	457,211	487,789	4,209,287	224,799	315,072
Reserve forces	8,534	12,155	10,278	115,255	18,013	10,466
Undistributed	−830	16,728	−14,803	865	—	−865
Total—Military Personnel	483,492	486,094	483,264	4,325,407	242,812	324,673
Operation and Maintenance	542,647	498,385	556,776	4,591,317	955,856	960,603
Procurement						
Aircraft	502,871	466,746	342,173	3,924,731	4,508,567	4,596,731
Missiles	114,991	126,078	124,113	1,028,838	1,000,194	914,345
Ordnance, vehicles & related equipment	162,565	106,069	65,807	1,211,474	1,719,842	1,820,352
Electronics and communications	53,790	37,734	32,155	322,252	555,915	511,021
Other procurement	70,124	39,906	26,183	406,899	164,740	108,236
Undistributed	1,680	−1,229	65	5,031	—	−5,051
Total—Procurement	906,023	775,304	590,496	6,899,226	7,949,258	7,945,636
Research, Development, Test, and Evaluation						
Military sciences	15,619	13,327	15,744	125,964	131,619	114,817
Aircraft	39,711	56,061	56,951	502,506	449,824	625,228
Missiles	70,993	88,877	65,113	725,751	366,248	415,763
Astronautics	68,308	80,125	114,145	863,515	622,047	512,906
Other equipment	26,586	9,685	24,245	237,072	233,992	224,065
Program-wide management and support	18,649	21,554	24,846	191,897	25,214	17,203
Undistributed	25	2,195	−2,433	1,328	—	−1,328
Total—Research, Development, Test & Eval.	239,892	271,824	298,611	2,648,033	1,828,944	1,908,656
Military Construction	49,492	36,655	32,095	381,485	473,206	286,281
Revolving and Management Funds	23,456	−15,871	−58,820	−5,025	6,252	−33,907
TOTAL—DEPARTMENT OF THE AIR FORCE	2,245,005	2,052,392	1,902,418	18,840,442	11,456,328	11,391,942

DEFENSE AGENCIES/OFFICE OF THE SECRETARY OF DEFENSE

	Expenditures				Unpaid obligations	
	Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	At start of year	As of Mar. 31, 1968
Military Personnel						
Retired pay	174,953	175,407	176,508	1,537,297	7,622	6,620
Operation and Maintenance	89,012	80,006	82,725	741,028	99,905	97,545
Procurement						
Ordnance, vehicles, and related equipment	619	321	286	2,766	2,230	1,037
Electronics and communications	189	1,271	257	5,260	5,330	5,860
Other procurement	3,386	1,044	5,376	24,086	44,346	40,604
Undistributed	−149	−197	100	48	—	−48
Total—Procurement	4,044	2,439	6,018	32,160	51,906	47,454
Research, Development, Test, and Evaluation						
Military sciences	47,027	52,512	39,254	372,991	474,774	434,705
Military Construction	1,489	4,337	1,040	15,744	20,674	10,739
Family Housing	44,682	6,330	46,045	369,814	114,964	205,458
Other—Special Foreign Currency Program	39	265	1	1,215	2,193	1,146
Revolving and Management Funds	14,292	−3,570	−13,900	129,250	—	−2,259
TOTAL—DEFENSE AGENCIES/OSD	375,537	317,727	337,693	3,199,500	772,037	801,408

OFFICE OF CIVIL DEFENSE

Civil Defense	8,161	11,905	10,312	80,653	91,893	77,648
Revolving and Management Funds	—	—	—	—	—	—
TOTAL—OFFICE OF CIVIL DEFENSE	8,161	11,905	10,312	80,653	91,983	77,648

MILITARY ASSISTANCE

Military Personnel	12	5	35	214	525	295
Operation and Maintenance	19,076	20,283	22,534	184,128	289,568	240,898
Procurement						
Aircraft	11,638	4,527	4,200	58,115	235,101	186,427
Missiles	309	169	1,454	4,519	23,650	15,413
Ships	2,827	7,472	1,401	16,625	114,450	105,742
Ordnance, vehicles, and related equipment	11,357	7,818	6,836	74,114	264,633	211,347
Electronics and communications	2,896	2,510	3,388	29,461	132,402	102,542
Other procurement	1,934	3,711	6,624	30,203	127,226	109,594
Total—Procurement	30,963	26,207	23,903	213,037	897,462	731,065
Research, Development, Test, and Evaluation	—	—	—	−980	401	79
Military Construction	897	−6,304	−1,960	2,703	171,824	6,827
Revolving Fund	17,405	−999	6,239	−12,657	764,607	680,195
Undistributed	4,120	−507	−6,588	−12,329	−12,030	−3,972
TOTAL—MILITARY ASSISTANCE	72,474	38,683	44,165	374,117	2,112,357	1,654,786

Obligations

Third Quarter, Fiscal Year 1968
(Amounts in Thousands)

DEPARTMENT OF DEFENSE

	Available for obligation	Obligations				Unobligated balance Mar. 31, 1968
		Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	
Military Personnel						
Active forces	19,001,605	1,637,226	1,596,930	1,594,538	14,308,542	4,693,063
Reserve forces	958,750	51,108	60,149	55,882	620,574	338,176
Retired pay	2,020,000	174,875	175,091	176,382	1,535,727	484,273
Total—Military Personnel	21,980,355	1,863,209	1,832,172	1,826,800	16,464,843	5,515,512
Operation and Maintenance	21,114,442	1,934,887	1,603,173	1,660,410	16,291,860	4,822,581
Procurement						
Aircraft	13,017,519	648,877	611,161	553,730	6,402,066	6,615,453
Missiles	3,098,769	237,761	172,301	335,209	1,885,939	1,212,830
Ships	4,896,298	122,266	114,042	195,815	1,141,552	3,754,746
Tracked combat vehicles	491,870	858	41,974	29,817	274,369	217,501
Ordnance, vehicles and related equipment	8,963,515	462,884	689,576	599,151	5,820,092	3,143,423
Electronics and communications	2,343,202	139,061	100,351	105,020	972,406	1,370,796
Other procurement	3,001,550	172,036	135,266	184,568	1,600,857	1,400,693
Undistributed	406,008	—	—	—	—	406,008
Total—Procurement	36,218,733	1,783,738	1,864,675	2,003,312	18,097,284	18,121,448
Research, Development, Test, & Evaluation						
Military sciences	1,158,421	89,364	59,685	56,324	720,862	437,559
Aircraft	1,445,543	168,789	67,398	60,688	1,015,958	429,585
Missiles	2,518,929	146,676	203,694	125,763	2,112,183	406,746
Astronautics	1,279,820	114,160	86,862	87,194	864,693	415,127
Ships	384,978	24,767	19,497	28,731	242,052	142,926
Ordnance, vehicles, and related equipment	386,854	20,536	33,201	32,165	263,250	123,604
Other equipment	899,630	60,294	56,461	57,018	550,695	348,935
Program-wide management and support	772,426	53,395	45,458	49,386	468,903	303,523
Emergency Fund	—	—	—	—	—	—
Undistributed	−80,854	—	—	—	—	−80,854
Total—Research, Development, Test, & Eval.	8,765,746	677,981	572,256	497,270	6,238,596	2,527,150
Military Construction	3,181,904	98,534	109,432	121,732	928,790	2,253,113
Family Housing	874,081	64,683	37,690	48,263	466,016	408,065
Civil Defense	108,603	11,787	11,857	7,268	68,039	40,564
Other—Special Foreign Currency Program	16,344	—	—	—	168	16,176
Subtotal—Military Functions	92,260,205	6,434,822	6,031,252	6,165,053	58,555,593	33,704,613
Military Assistance	287,362	9,959	60,713	--75,741	166,580	120,783
TOTAL—DEPARTMENT OF DEFENSE	92,547,568	6,444,780	6,091,965	6,089,312	58,722,173	33,825,394

DEPARTMENT OF THE ARMY

	Available for obligation	Obligations				Unobligated balance Mar. 31, 1968
		Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	
Military Personnel						
Active forces	7,874,405	683,861	643,774	635,627	5,816,457	2,057,948
Reserve forces	644,100	30,306	35,661	32,338	398,801	245,299
Total—Military Personnel	8,518,505	714,168	679,436	667,966	6,215,258	2,303,247
Operation and Maintenance	8,191,306	730,848	619,444	689,950	6,279,181	1,912,125
Procurement						
Aircraft	1,218,880	94,923	66,626	85,054	522,273	696,607
Missiles	705,682	28,175	37,234	138,323	497,650	208,032
Tracked combat vehicles	475,953	666	41,383	29,647	270,097	205,856
Ordnance, vehicles and related equipment	5,059,756	286,306	375,345	284,033	3,064,164	1,995,592
Electronics and communications	880,686	21,327	40,099	20,051	354,336	526,350
Other procurement	946,636	22,798	27,531	46,454	441,078	505,558
Undistributed	318,096	—	—	—	—	318,096
Total—Procurement	9,605,689	454,197	588,218	603,562	5,149,598	4,456,091
Research, Development, Test, & Evaluation						
Military sciences	183,264	14,387	12,584	10,243	123,201	60,063
Aircraft	150,558	7,986	7,622	4,695	93,932	56,626
Missiles	706,425	58,487	114,129	24,793	602,904	103,521
Astronautics	12,222	435	1,226	2,170	7,961	4,261
Ordnance, vehicles and related equipment	198,070	11,338	12,083	12,629	134,452	63,618
Other equipment	416,255	24,925	21,925	28,620	223,677	192,578
Program-wide management and support	85,085	4,493	5,611	6,968	67,450	17,635
Undistributed	106,677	—	—	—	—	106,677
Total—Research, Development, Test & Eval.	1,858,556	122,051	175,180	90,118	1,253,577	604,979
Military Construction	1,293,993	52,015	25,206	55,038	403,505	890,488
TOTAL—DEPARTMENT OF THE ARMY	29,468,048	2,073,279	2,087,482	2,106,634	19,301,118	10,166,930

DEPARTMENT OF THE NAVY

	Available for obligation	Obligations				Unobligated balance Mar. 31, 1968
		Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	
Military Personnel						
Active forces	5,479,900	476,609	473,695	473,696	4,167,146	1,312,754
Reserve forces	154,620	12,568	14,037	12,981	113,552	41,068
Total—Military Personnel	5,634,520	489,175	487,734	486,676	4,280,698	1,353,822
Operation and Maintenance	5,831,006	561,705	386,166	404,895	4,331,348	1,499,658
Procurement						
Aircraft	3,973,091	194,014	227,852	186,353	1,611,022	2,362,069
Missiles	775,598	41,857	23,008	57,207	408,517	367,081
Ships	4,896,298	122,266	114,042	195,815	1,141,552	3,754,746
Tracked combat vehicles	15,917	192	591	170	4,272	11,645
Ordnance, vehicles and related equipment	2,173,652	86,125	171,293	196,997	1,442,371	731,281
Electronics and communications	810,634	65,717	38,606	52,218	305,847	504,787
Other procurement	1,431,088	82,801	74,571	114,194	780,954	650,134
Undistributed	−258,589	—	—	—	—	−258,589
Total—Procurement	13,817,689	592,966	649,965	802,956	5,694,536	8,123,154
Research, Development, Test, and Evaluation						
Military sciences	203,049	16,352	12,480	13,443	139,764	63,285
Aircraft	362,073	79,290	10,772	28,070	215,497	146,576
Missiles	821,783	23,273	34,914	41,093	691,919	129,864
Astronautics	23,608	1,909	1,593	2,808	17,611	5,997
Ships	384,978	24,767	19,497	28,731	242,052	142,926
Ordnance, vehicles and related equipment	188,784	9,198	21,118	19,536	128,798	59,986
Other equipment	149,379	7,101	14,556	7,171	92,626	56,753
Program-wide management and support	422,290	29,274	20,798	28,328	206,497	215,793
Undistributed	−88,893	—	—	—	—	−88,893
Total Research, Development, Test & Eval.	2,467,051	191,164	135,728	169,180	1,734,764	732,287
Military Construction	1,090,349	29,207	50,942	42,176	323,959	766,390
TOTAL—DEPARTMENT OF THE NAVY	28,840,617	1,864,217	1,710,535	1,905,883	16,365,305	12,475,312

DEPARTMENT OF THE AIR FORCE

	Available for obligation	Obligations				Unobligated balance Mar. 31, 1968
		Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	
Military Personnel						
Active forces	5,647,300	476,756	479,461	485,215	4,324,939	1,322,361
Reserve forces	160,030	8,234	10,451	10,563	108,221	51,809
Total—Military Personnel	5,807,330	484,990	489,913	495,775	4,433,160	1,374,170
Operation and Maintenance	6,056,990	548,632	519,523	479,354	4,901,572	1,155,418
Procurement						
Aircraft	7,825,548	359,940	316,683	282,323	4,268,771	3,556,777
Missiles	1,617,489	167,729	112,059	139,679	979,772	637,717
Ships	—	—	—	—	—	—
Ordnance, vehicles and related equipment	1,725,319	90,420	142,935	117,711	1,311,984	413,335
Electronics and communications	638,445	51,314	20,425	31,243	306,433	332,012
Other Procurement	555,039	63,809	30,680	19,646	350,395	204,644
Undistributed	346,346	—	—	—	—	346,346
Total—Procurement	12,708,187	733,212	622,783	590,600	7,217,355	5,490,831
Research, Development, Test & Evaluation						
Military sciences	184,858	12,786	10,815	12,564	121,405	63,453
Aircraft	932,912	81,513	49,004	27,923	706,529	226,383
Missiles	990,721	64,916	54,651	59,877	817,360	173,361
Astronautics	1,243,990	111,816	84,043	82,216	839,121	404,869
Other equipment	333,996	28,268	19,980	21,227	234,392	99,604
Program-wide management and support	265,051	19,628	19,049	14,090	194,956	70,095
Undistributed	−98,638	—	—	—	—	−98,638
Total—Research, Development, Test & Eval.	3,852,889	318,929	237,541	217,898	2,913,763	939,126
Military Construction	713,759	17,107	29,442	24,292	195,517	518,242
TOTAL—DEPARTMENT OF THE AIR FORCE	29,139,155	2,102,869	1,899,203	1,807,919	19,661,367	9,477,787

DEFENSE AGENCIES/OFFICE OF THE SECRETARY OF DEFENSE

	Available for obligation	Obligations				Unobligated balance Mar. 31, 1968
		Jan. 1968	Feb. 1968	Mar. 1968	Cum. thru Mar. 31, 1968	
Military Personnel						
Retired Pay	2,020,000	174,875	175,091	176,382	1,535,727	484,273
Operation and Maintenance	1,035,139	93,703	78,039	86,211	779,759	255,380
Procurement						
Ordnance, vehicles and related equipment	4,788	33	3	410	1,573	3,215
Electronics and communications	13,437	703	1,221	1,508	5,790	7,647
Other procurement	68,787	2,628	2,484	4,274	28,430	40,357
Undistributed	155	—	—	—	—	155
Total—Procurement	87,167	3,363	3,709	6,192	35,793	51,374
Research, Development, Test, and Evaluation						
Military sciences	587,250	45,839	23,806	20,074	336,492	250,758
Emergency Fund	—	—	—	—	—	—
Undistributed	—	—	—	—	—	—
Total—Research, Development, Test & Eval.	587,250	45,839	23,806	20,074	336,492	250,758
Military Construction	83,803	205	3,842	226	5,809	77,993
Family Housing	874,081	64,683	37,690	48,263	466,016	408,065
Other—Special Foreign Currency Program	16,344	—	—	—	168	16,176
TOTAL—DEFENSE AGENCIES/OSD	4,703,783	382,668	322,177	337,348	3,159,765	1,544,018

OFFICE OF CIVIL DEFENSE

Civil Defense	108,603	11,787	11,857	7,268	68,039	40,564

MILITARY ASSISTANCE

Military Personnel	−17	−48	56	−46	−17	—
Operation and Maintenance	255,631	9,143	18,772	−11,001	135,409	120,222
Procurement						
Aircraft	9,945	1,728	21,865	−27,004	9,440	505
Missiles	−3,554	208	1,003	1,104	−3,717	163
Ships	8,006	15	6,754	−4,399	7,917	89
Ordnance, vehicles and related equipment	20,828	−287	5,695	−5,722	20,828	—
Electronics and communications	−397	−237	3,127	−10,047	−399	2
Other procurement	12,778	−624	2,466	−3,693	12,623	155
Total—Procurement	47,606	803	40,910	−49,761	46,692	914
Research, Development, Test, and Evaluation	−1,300	—	—	—	−1,301	1
Military Construction	−13,940	69	1,000	−14,953	−14,182	242
Undistributed	−616	−9	−23	18	−21	−595
TOTAL—MILITARY ASSISTANCE	287,362	9,959	60,713	−75,741	166,580	120,783

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

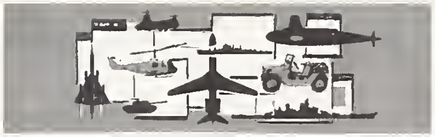
	1966 I	II	III	IV	1967 I	II	III	IV	1968 Jan	Feb	Mar	I	Apr	May
I. *Military Prime Contract Awards*[1]														
Aircraft	$ 1,944	$ 2,985	$ 2,696	$ 2,261	$ 2,101	$ 3,049	$ 2,512	$ 2,632	$ 442	$ 529	$ 574	$ 1,545	$ 834	$ 1,129
Missle and Space Systems	997	957	1,244	843	1,162	1,140	1,525	1,045	345	419	387	1,151	337	449
Ships	354	491	871	239	679	406	416	409	108	77	236	421	79	224
Weapons and Ammunition	545	1,482	692	931	815	1,768	1,103	1,335	225	416	382	1,023	423	431
Electronic & Communications Equipment	861	1,543	605	907	922	1,813	719	811	308	259	240	807	328	407
Combat Vehicles	114	221	139	195	57	225	173	99	26	79	30	135	62	35
Other Hard Goods	721	1,615	520	831	856	1,337	610	554	214	269	276	759	252	285
Soft Goods	709	921	1,077	989	637	651	1,054	491	437	139	202	778	218	211
Construction	207	392	197	149	232	624	231	212	61	53	67	181	39	195
Services	392	584	1,449	506	481	555	1,483	734	163	141	184	488	162	116
Educational & Non-Profit Institutions	198	214	197	119	235	205	233	149	95	84	40	219	52	30
Awards Under $10,000	936	1,241	849	1,054	1,013	1,295	779	821	261	305	325	891	324	346
Total	7,978	12,646	10,536	9,024	9,190	13,068	10,838	9,292	2,685	2,770	2,943	8,398	3,090	3,858
Total, Seasonally Adjusted	8,814	10,132	10,646	10,220	10,328	10,632	10,955	10,413	2,887	3,445	3,185	9,517	3,488	4,203
Work Outside U. S.	521	1,195	856	672	453	834	891	455	288	139	134	561	157	135
II. *Gross Obligations Incurred*														
Operations	8,326	9,604	10,426	9,702	10,229	11,435	11,224	10,812	3,798	3,435	3,487	10,721	3,799	
Procurement	4,374	8,539	5,368	5,276	5,113	8,948	6,154	6,292	1,784	1,865	2,003	5,652	2,239	
Other	2,429	3,470	3,453	2,230	2,519	3,510	3,420	2,194	863	792	553	2,206	742	
Total	15,129	21,613	19,247	17,208	17,861	23,893	20,798	19,298	6,445	6,092	6,043	18,579	6,780	
III. *Gross Unpaid Obligations Outstanding*														
Operations	3,828	3,777	4,792	5,024	4,644	4,513	5,267	5,150	5,127	5,127	4,975	4,975	4,938	
Procurement	18,023	22,119	22,736	23,173	22,780	25,248	24,925	24,856	24,197	24,024	24,127	24,127	23,947	
Other	5,625	5,942	8,026	7,253	6,996	7,506	7,971	7,360	7,329	7,303	7,038	7,038	6,848	
Total	27,476	31,838	35,554	35,450	34,420	37,267	38,163	37,366	36,653	36,454	36,140	36,140	35,733	
IV. *Net Expenditures*														
Operations	7,689	9,076	8,968	9,087	10,002	10,731	10,001	10,494	3,550	3,273	3,416	10,239	3,622	
Procurement	3,651	3,886	4,392	4,264	5,074	5,282	6,060	5,598	2,274	1,913	1,680	5,867	2,109	
Other	2,757	2,647	2,484	3,092	3,160	2,001	3,047	2,363	1,153	1,032	1,025	3,210	1,175	
Total	14,097	15,609	15,844	16,443	18,236	18,014	19,108	18,455	6,977	6,218	6,121	19,316	6,906	
V. *DOD Personal Compensation*														
Military	3,181	3,249	3,551	3,606	3,624	3,646	3,842	3,972	1,338	1,339	1,338	4,014	1,343	
Civilian	1,937	2,015	2,105	2,135	2,170	2,248	2,271	2,332	828	774	773	2,375	803	844(p)
Total	5,118	5,264	5,656	5,741	5,794	5,894	6,113	6,304	2,166	2,113	2,111	6,389	2,146	
VI. *Outstanding Payments*														
Advance Payments	66	79	90	83	92	80	110	134				128		
Progress Payments	4,402	4,346	4,750	5,461	5,981	6,765	7,179	7,491				7,681		
Total	4,468	4,425	4,840	5,544	6,073	6,845	7,289	7,625				7,809		
VII. *Strength (Manpower)*														
Military	2,969	3,094	3,229	3,344	3,371	3,377	3,412	3,398	3,427	3,440	3,467	3,467	3,494	
Civilian	1,088	1,138	1,184	1,230	1,268	1,303	1,274	1,271	1,267	1,265	1,266	1,266	1,267	1,271(p)

P = Preliminary

[1] = Revised—See new definition.

Note: Open spaces for Indicators other than No. VI indicate information not available at time of publication. Indicator No. VI information available only on a quarterly basis. Totals may not add due to rounding.

Directorate for Statistical Services
OASD(Comptroller)
June 28 1968



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of June 1968:

DEFENSE SUPPLY AGENCY

3—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP–5 jet fuel:

Beacon Oil Co., Hanford, Calif. $1,099,454. 7,700,000 gallons. DSA 600–69–D–0002.

Douglas Oil Co., Los Angeles, Calif. $2,660,900. 21,000,000 gallons. DSA 600–69–D–0004.

Edgington Oil Refineries, Long Beach, Calif. $1,636,000. 12,000,000 gallons. DSA 600–69–D–0005.

Fletcher Oil & Refining Co., Carson, Calif. $1,846,650. 13,500,000 gallons. DSA 600–69–D–0006.

Golden Eagle Refining Co., Los Angeles, Calif. $4,266,633. 31,500,000 gallons. DSA 600–69–D–0007.

Gulf Oil, New York, N.Y. $3,866,652. 37,475,100 gallons. DSA 600–69–D–0008.

Humble Oil & Refining Co., Houston, Tex. $10,095,859. 100,464,000 gallons. 600–69–D–0012.

Mobil Oil, New York, N.Y. $7,077,640. 65,600,000 gallons. DSA 600–69–D–0015.

Phillips Petroleum Co., Bartlesville, Okla. $1,633,163. 12,670,000 gallons. DSA 600–69–D–0016.

Sun Oil Co., Philadelphia, Pa. $2,108,119. 18,480,000 gallons. DSA 600–69–D–0017.

Union Oil Co., Los Angeles, Calif. $2,289,827. 17,178,000 gallons. DSA 600–69–D–0018.

U.S. Oil & Refining Co., Tacoma, Wash. $1,543,437. 11,459,100 gallons. DSA 600–69–D–0019.

—**Hess Oil & Chemical Corp.**, Perth Amboy, N.J. $5,470,088. 397,000 barrels of combat gasoline, 290,000 barrels of diesel fuel grade DF–1 and 595,000 barrels of diesel marine fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1769.

—**Union Oil Co.**, Los Angeles, Calif. $5,383,080. 1,830,000 barrels of Navy special fuel oil and 500,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1773.

—**Humble Oil & Refining Co.**, Houston, Tex. $3,350,991. 634,000 barrels of combat gasoline, type one. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1772.

—**Atlantic Richfield Co.**, Los Angeles, Calif. $2,776,140. 1,060,000 barrels of Navy special burner fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2073.

—**Union Oil Co.**, Los Angeles, Calif. $2,712,710. 250,000 barrels of diesel fuel oil, grade DF–A, and 327,000 barrels of diesel marine fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1173 P001.

--**Marathon Oil Co.**, Findlay, Ohio. $2,487,100. 570,000 barrels of diesel fuel oil, grade DF–1. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1771.

—**Golden Eagle Refining Co.**, Los Angeles, Calif. $2,275,125. 850,000 barrels of Navy special burner fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2072.

—**Continental Oil Co.**, Houston, Tex. $1,398,960. 348,000 barrels of diesel marine fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1770.

—**Edgington Oil Refineries**, Long Beach, Calif. $1,204,950. 450,000 barrels of Navy special burner fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1780.

5—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP–4 jet fuel:

Sunray DX Oil Co., Tulsa, Okla. $2,758,300. 30,000,000 gallons. DSA 600–69–D–0093.

Southland Oil Co., Yazoo City, Miss. $1,103,428. 10,150,000 gallons. DSA 600–69–D–0088.

Howell Refining Co., San Antonio, Tex. $4,127,338. 37,500,000 gallons. DSA 600–69–D–0058.

Tonkawa Refining Co., Abilene, Tex. $2,523,340. 24,000,000 gallons. DSA 600–69–D–0098.

Diamond Shamrock Corp., Amarillo, Tex. $4,250,205. 36,753,000 gallons. 600–69–D–0044.

Bell Oil & Gas Co., Bartlesville, Okla. $5,069,197. 54,000,000 gallons. DSA 600–69–D–0032.

Monarch Refining Co., San Antonio, Tex. $1,024,800. 9,000,000 gallons. DSA 600–69–D–0074.

MacMillan Ring-Free Oil Co., Los Angeles, Calif. $2,908,400. 22,000,000 gallons. DSA 600–69–D–0068.

Adobe Refining Co., Midland, Tex. $3,661,387. 33,000,000 gallons. DSA 600–69–D–0020.

Tesoro Petroleum Corp., San Antonio, Tex. $2,054,740. 18,000,000 gallons. DSA 600–69–D–0095.

American Petrofina Co., Dallas, Tex. $4,159,855. 42,000,000 gallons. DSA 600–69–D–0024.

Atlantic Richfield Co., Los Angeles, Calif. $5,170,630. 42,000,000 gallons. DSA 600–69–D–0028.

Cities Service Oil Co., New York, N.Y. $2,426,012. 25,200,000 gallons. DSA 600–69–D–0037.

Standard Oil Co., San Francisco, Calif. $24,248,145. 217,929,600 gallons. DSA 600-69-D-0091.

Bayou Refining Co., Pasadena, Tex. $3,115,235. 31,000,000 gallons. DSA 600–69–D–0030.

Phillips Petroleum Co., Bartlesville, Okla. $7,247,318. 65,058,000 gallons. DSA 600–69–D–0080.

Cardinal Transports, San Antonio, Tex. $1,170,630. 11,000,000 gallons. DSA 600–69–D–0034.

Sioux Oil Co., New Castle, Wyo. $2,400,000. 20,000,000 gallons. DSA 600–69–D–0087.

Champlin Petroleum Co., Fort Worth, Tex. $1,237,500. 12,500,000 gallons. DSA 600–69–D–0035.

Kerr-McGee Corp., Oklahoma City, Okla. $1,389,000. 15,000,000 gallons. DSA 600–69–D–0064.

Edgington Oil Refineries, Long Beach, Calif. $2,143,000. 17,000,000 gallons. DSA 600–69–D–0046.

Humble Oil & Refining Co., Houston, Tex. $26,531,701. 274,324,000 gallons. DSA 600–69–D–0059.

Southwestern Oil & Refining Co., Corpus Christi, Tex. $1,669,920. 16,800,000 gallons. DSA 600–69–D–0089.

Hunt Oil Co., Dallas, Tex. $1,104,000. 11,500,000 gallons. DSA 600–69–D–0060.

Shell Oil Co., New York, N.Y. $1,513,500. 15,000,000 gallons. DSA 600–69–D–0084.

Sinclair Refining Co., New York, N.Y. $2,362,500. 21,000,000 gallons. DSA 600–69–D–0086.

Sun Oil Co., Philadelphia, Pa. $8,364,920. 78,498,000 gallons. DSA 600–69–D–0092.

Gulf Oil Corp., New York, N.Y. $14,653,500. 141,000,000 gallons. DSA 600–69–D–0055.

Hess Oil & Chemical Corp., Perth Amboy, N.J. $2,844,450. 29,400,000 gallons. DSA 600–69–D–0057.

Signal Oil & Gas Co., Houston, Tex. $2,410,800. 25,200,000 gallons. DSA 600–69–D–0085.

Getty Oil Co., New York, N.Y. $4,959,045. 44,058,000 gallons. DSA 600–69–D–0051.

Coastal States Petrochemical Co., Houston, Tex. $18,810,755. 184,750,000 gallons. DSA 600–69–D–0038.

Douglas Oil Co., Los Angeles, Calif. $2,633,600. 22,000,000 gallons. DSA 600–69–D–0045.

Union Oil Co., Los Angeles, Calif. $6,649,986. 55,564,000 gallons. DSA 600–69–D–0100.

Triangle Refineries, Houston, Tex. $2,672,175. 23,560,000 gallons. DSA 600–69–D–0099.

6—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP–4 jet fuel:

Fletcher Oil & Refining Co., Carson, Calif. $3,594,542. 27,500,000 gallons. DSA 600–69–D–0049.

Sequoia Refining Corp., Corpus Christi, Tex. $1,103,023. 11,592,000 gallons. DSA 600–69–D–0083.

Mobil Oil, New York, N.Y. $23,139,016. 210,900,000 gallons. DSA 600–69–D–0072.

American Oil, Chicago, Ill. $4,385,936. 43,957,000 gallons. DSA 600–69–D–0023.

Continental Oil, Houston, Tex. $9,749,068. 100,037,800 gallons. DSA 600–69–D–0040.

Okmulgee Refining Co., Okmulgee, Okla. $1,789,111. 18,840,000 gallons. DSA 600–69–D–0076.

Delta Refining Co., Memphis, Tenn. $4,562,447. 41,975,000 gallons. DSA 600–69–D–0042.

Hercules Oil, Long Beach, Calif. $1,221,551. 9,000,000 gallons. DSA 600–69–D–0056.

Ashland Oil & Refining Co., Ashland, Ky. $7,764,115. 73,208,000 gallons. DSA 600–69–D–0027.

Fort Worth Refining Co., Houston, Tex. $4,623,235. 42,863,000 gallons. DSA 600–69–D–0050.

Kern County Refinery Co., Los Angeles, Calif. $2,230,782. 16,200,000 gallons. DSA 600–69–D–0063.

Good Hope Refineries, Houston, Tex. $3,829,500. 37,000,000 gallons. DSA 600–69–D–0054.

Golden Eagle Refining Co., Los Angeles, Calif. $5,353,740. 42,000,000 gallons. DSA 600–69–D–0053.

Crystal Flash Petroleum Corp., Indianapolis, Ind. $1,513,845. 13,050,000 gallons. DSA 600–69–D–0041.

10—**Orthopedic Equipment Co.**, Bourbon, Ind. $1,123,463. 68,130 folding, rigid aluminum pole litters. Defense Personnel Support Center, Philadelphia, Pa. DSA 120–68–C–4358.

11—**Standard Oil Co. of Calif.**, San Francisco, Calif. $1,714,929. 11,706,000 gallons of kerosene propellant. Defense Personnel Support Center, Philadelphia, Pa. DSA 600–69–D–0111.

13—**Boothe Packing Co.**, Modesto, Calif. $1,505,822. 1,800,837 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa. DSA 130–68–C–Z005.

—**Southern Packaging & Storage Co.**, Greenville, Tenn. $2,888,536. Assembly of 3,954,100 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa. DSA 130–68–C–Z007.

17—**Tanebaum Textile Co., Inc.**, New York, N.Y. $4,328,213. 4,508,000 yards of wind resistant cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2603.

—**Prestex, Inc.**, New York, N.Y. $1,025,860. 1,100,000 yards of wind resistant cotton cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2602.

—**J. P. Stevens & Co., Inc.**, New York, N.Y. $1,333,260. 1,500,000 yards of wind resistant cotton cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2601.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency—Contract number.

—**Oscar Mayer & Co.**, Madison, Wis. $1,054,242. 828,000 cans of ham hunks. Defense Personnel Support Center, Philadelphia, Pa. DSA 130-8-C-14523.

18—**Dole Co.**, San Jose, Calif. $1,003,236. 661,120 cases of pineapple juice. Defense Personnel Support Center, Philadelphia, Pa. DSA 137-68-C-0001.

19—**Major Coat Co.**, Bridgeton, N.J. $1,344,979. 67,350 men's polyester wool tropical coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-67-C-2670.

—**Reflective Laminates, Inc.**, Newbury Park, Calif. $1,095,478. 10,728 plates of body armor and 7,923 body armor carriers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-68-C-2684.

20—**Shell Oil Co.**, New York, N.Y. $1,479,767. 3,077,000 gallons of grade 115/145 aviation gasoline; 412,000 gallons of grade 100/130 aviation gasoline; 1,456,000 gallons of JP-4 jet fuel; 890,000 gallons of ASTF 640 commercial jet fuel and 59,300 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600-68-D-2136.

—**Gulf Oil Corp.**, Houston, Tex. $6,995,715. 31,636,000 gallons of gasoline and 17,798,000 gallons of diesel fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600-68-D-2010.

25—**M&B Headwear Co.**, Richmond, Va. $1,569,590. 751,000 hats with camouflage pattern insect nets. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-68-C-2732.

—**Gibraltar Fabrics**, Brooklyn, N.Y. $1,593,000. 200,000 poncho liners. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-68-C-2726.

—**Rachman Mfg. Co.**, Reading, Pa. $1,016,116. 68,150 body armor vests. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-68-C-2727.

26—**Landis Clothes**, Vineland, N.J. $1,003,872. 60,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-68-C-2736.

28—**Page Airways, Inc.**, Rochester, N.Y. $1,422,990. Operation and maintenance of the Defense Industrial Plant Equipment Facility, Atchison, Kan. Defense Industrial Plant Equipment Center, Memphis, Tenn. DSA 002-68-C-0002.

—**Met-Pro Water Treatment Corp.**, Lansdale, Pa. $2,536,166. Water purification equipment sets. Defense Construction Supply Center, Columbus, Ohio. DSA 700-68-C-9773.

—**Delta Petroleum Co.**, New Orleans, La. $1,253,848. 2,778,293 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va. DSA 640-68-D-0107.

—**Continental Steel Corp.**, Kokomo, Ind. $1,226,102. 99,360 spools of barbed wire. Defense Construction Supply Center, Columbus, Ohio. DSA 700-68-C-A176.

—**CF&I Steel Corp.**, Denver, Colo. $1,651,500. 150,000 spools of barbed wire. Defense Constrcction Supply Center, Columbus, Ohio, DSA 700-68-C-A173.

—**Northwestern Steel & Wire Co.**, Sterling, Ill. $1,391,040. 120,960 spools of barbed wire. Defense Construction Supply Center, Columbus, Ohio. DSA 700-68-C-A174.

DEPARTMENT OF THE ARMY

3—**Page Aircraft Maintenance, Inc.**, Fort Rucker, Ala. $29,529,599. Performance of organization, direct and general support maintenance, and schedule inspections of rotary and fixed-wing aircraft. Fort Stewart, Ga. Army Aviation Center, Fort Rucker, Ala.

—**Day & Zimmermann, Inc.**, Philadelphia, Pa. $44,123,398. Loading, assembling, and packing of miscellaneous ammunition items, and for maintenance of plant facilities at the Lone Star Army Ammunition Plant, Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11-173-AMC-00114 (A).

—**Beaver State Contractors**, Mossy Rock, Wash. $3,645,886. Clearing and grading work at the Libby Dam Project. Lincoln County, Mont. Engineer Dist., Seattle, Wash. DA CW67-68-C-0076.

—**Colt's, Inc.**, Hartford, Conn. $1,163,459. Twenty-round magazine assemblies for the M16/M16A1 rifle. Army Weapons Command, Rock Island, Ill. DA AF03-68-C-0049.

4—**General Motors**, Detroit, Mich. $4,757,470. Work on the XM70 Main Battle Tank. Cleveland, Ohio and Milwaukee, Wis. Tank Automotive Command, Warren, Mich. DA 20-113-AMC-08843 (T).

—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $1,525,000. Engineering support for production of the LD/LDS 465 family of multi-fuel engines. Tank Automotive Command, Warren, Mich. DA AE07-67-C-5606.

—**Lockheed Aircraft Corp.**, Sunnyvale, Calif. $1,397,873. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Sunnyvale, Calif.: Seattle, Wash. and the Nevada Test Site. Defense Atomic Support Agency. DA SA01-68-C-0146.

5—**E. J. Freethy**, El Cerrito, Calif. $2,513,508. Construction work at the Corte Madera Creek Project. Marin Co., Calif. Engineer Dist., San Francisco, Calif. DA CW68-C-0053.

—**Chamberlain Mfg. Co.**, Elmhurst, Ill. $4,828,608. Metal parts for 155mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-67-C-0365.

—**Northrop Carolina, Inc.**, Asheville, N.C. $2,528,140. 40mm cartridges. Swannancoa, N.C. Edgewood Arsenal, Edgewood, Md. DA AA15-68-C-0062.

—**Harvey Aluminum**, Torrance, Calif. $1,226,420. Metal parts for 40mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AG07-68-C-0653.

6—**Phalo Corp.**, Shrewbury, Mass. $1,733,238. Cable assemblies with electrical connector plugs and preformed wire grips. Laredo, Tex. Electronics Command, Philadelphia, Pa. DA AB05-68-C-0638.

—**Consolidated Box Co.**, Tampa, Fla. $2,445,561. Ammunition containers. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0475.

—**United Ammunition Container Corp.**, Philadelphia, Pa. $1,233,881. Fiber ammunition containers. Atlanta, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0476.

—**Penland Paper Converting Corp.** $1,214,063. Ammunition fiber containers. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0477.

7—**Sperry Rand Corp.**, Phoenix, Ariz. $1,200,335. ID-998/ASN indicators and AM-3209/ASN amplifiers for aircraft flight control systems. Salt Lake City, Utah and Phoenix, Ariz. Army Procurement Agency, Pasadena, Calif. DA AG07-68-C-1290.

—**Raytheon Co.**, Lexington, Mass. $2,227,750. Metal parts for bombs. Bristol, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0027.

—**M-B Contracting Co.**, Seattle, Wash. $1,034,543. Construction of taxiway pavements at Elmendorf AFB, Alaska. Engineer Dist., Anchorage, Alaska. DA CA85-68-C-0920.

—**Hughes Tool Co.**, Culver City, Calif. $1,499,100. OH-6A helicopters, $2,405,308. OH-6A transmission assemblies. Aviaiton Materiel Command, St. Louis, Mo. DA 23-204-AMC-03697.

10—**Honeywell, Inc.**, Hopkins, Minn. $1,984,000. Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0282.

—**Hardaway Contracting Co.**, Columbus, Ga. $2,304,600. Construction and dredging work at the Ponce de Leon Inlet Project. Daytona, Fla. Engineer Dist., Jacksonville, Fla. DA CW17-68-C-0087.

—**Blount Bros.**, Montgomery, Ala. $1,875,000. Rehabilitation, conversion, and new construction at the Army Ammunition Plant, Ravenna, Ohio. Engineer Dist., Louisville, Ky. DA CA27-68-C-0045.

—**Raymark Cargo, Inc.**, Oakland, Calif. $1,822,792. Packing container services at the Oakland Army Base, Oakland, Calif. Western Area, Military Traffic Management and Terminal Service, Oakland, Calif. DA HC23-68-D-0073.

11—**Consolidated Diesel Electric Co.**, Old Greenwich, Conn. $28,585,799. 1¼-ton cargo trucks. Charlotte, N.C. and Schenectady, N.Y. Tank Automotive Command, Warren, Mich. DA AE07-68-C-2606.

—**General Motors**, Detroit, Mich. $5,615,003. Diesel engines for M561 cargo trucks. Tank Automotive Command, Warren, Mich. DA AE07-68-C-2597.

—**Bell Helicopter**, Fort Worth, Tex. $1,421,851. Flight control cylinder assemblies for UH-1 helicopters. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA AJ01-68-A-0022.

—**Great Lakes Dredge & Dock Co.**, New Orleans, La. $2,281,660. Work on the Mississippi River and Tributaries, Atchafalaya Basin Floodway Project. Iberville Parish, La. Engineer Dist., New Orleans, La. DA CW29-68-C-0203.

12—**Akwa Downey Construction Co.**, Milwaukee, Wis. $1,238,628. Construction of a communication electronic shop and an addition to an existing auto maintenance shop including site preparation, excavation and all support utilities. MacDill AFB, Fla. Engineer Dist., Jacksonville, Fla. DA CA17-68-C-0048.

—**Texas Instruments, Inc.**, $1,500,000. Classified electronic equipment. Electronics Command, Fort Monmouth, N.J.

—**Hughes Aircraft**, Culver City, Calif. $1,342,458. Iroquois Night Fighter and Night Tracker (INFANT)). Electronics Command, Fort Monmouth, N.J. DA AB07-68-C-0188.

—**Atlantic Gulf & Pacific Co.**, New York, N.Y. $1,676,845. Dredging work on the Newport News, Va., channel project. Engineer Dist., Norfolk, Va. DA CW65-68-C-0080.

—**Lockheed Electronics Co.**, Plainfield, N.J. $2,069,951. Radar sets for XM163 Weapons System (Vulcan Air Defense). Metuchen, N.J. Frankford Arsenal, Philadelphia, Pa. DA AA25-67-C-0928.

—**Meyer Casket Co.**, Lynn, Ind. $1,377,248. Metal caskets. Western Area, Military Traffic Management and Terminal Service, Oakland, Calif. DA HC23-68-D-0096.

—**RCA**, Camden, N.J. $12,218,705. Operation and maintenance of Government-owned radar systems and target acquisition systems at the White Sands Missile Range N.M. White Sands Missile Range, N.M. DA AD07-68-C-0162.

—**General Dynamics**, Pomona, Calif. $2,748,410. Redeye trainer systems. Army Missile Command, Huntsville, Ala. DA AH01-68-C-1582.

13—**Thiokol Chemical Corp.**, Woodbine, Ga. $1,922,360. Technical chemical agent. Edgewood Arsenal, Edgewood, Md. DA AA15-68-C-0707.

—**G. A. McDonald Construction Co. and R. P. Burruss**, Montrose, Calif. $1,429,960. Work on the Oro Grade Wash Project. Victorville, Calif. Engineer Dist., Los Angeles, Calif. DA CW09-68-C-0053.

14—**LTV Electrosystems, Inc.**, Huntington, Ind. $4,266,634. Vehicular radio communication sets. Electronics Command, Philadelphia, Pa. DA AB05-67-C-0171.

—**Northrop Corp.**, Rolling Meadows, Ill. $2,981,733. Radio set components. Chicago and Cicero, Ill. Electronics Command, Philadelphia, Pa. DA AB05-68-C-0031.

—**Electrospace Corp.**, Glen Cove, N.Y. $2,260,476. Radio sets and components. Electronics Command, Philadelphia, Pa. DA AB05-68-C-0034.

—**Philco-Ford Corp.**, Newport Beach, Calif. $7,925,199. Shillelagh guided missiles. Hawthorne, Calif. Army Missile Command, Huntsville, Ala. DA AH01-67-C-0002.

—**Sylvania Electric Products, Inc.**, Mountain View, Calif. $5,954,803. Classified work. Mountain View and Santa Cruz, Calif. Mobility Equipment Command, Fort Belvoir, Va. DA AK02-68-C-0210.

—**Brunswick Corp.**, Sugar Grove, Va. $3,351,100. 4.2-inch projectile canisters filled with technical chemical agent. Smyth County, Va. Edgewood Arsenal, Md. DA AA15-68-C-0722.

—**Mohawk Rubber Co.**, Akron, Ohio. $2,144,688. 5-ton truck pneumatic tires. West Helena, Ark., and Salem, Va. Tank Automotive Command, Warren, Mich. DA AE07–68–C–2764.

—**Allison Steel Mfg. Co.**, Phoenix, Ariz. $1,516,644. Bridge road beds for pontoon bridges. Mobility Equipment Command, St. Louis, Mo. DA AK01–68–C–8088.

—**Honeywell, Inc.**, Hopkins, Minn. $1,283,364. XM224 bomb fuzes. Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0490.

—**AVCO Corp.**, Nashville, Tenn. $1,066,724. Ballistic cases for Lance warhead sections. Nashville, Tenn., and Wilmington, Mass. Army Procurement Agency, Cincinnati, Ohio. DA AG31–68–C–0758.

—**Whirlpool Corp.**, Evansville, Ind. $1,036,774. 152mm canisters. Picatinny Arsenal, Dover, N.J. DA AA21–68–C–0757.

—**Ammann & Whitney**, N.Y., N.Y. $3,115,546. Architect engineer services for design of Sentinel Perimeter Acquisition Radar (PAR) Facilities, excluding design of the power and support facilities. The PAR Facilities will be located at Boston, Mass., and Detroit, Mich. Engineer Dist., Huntsville, Ala. DA CA87–68–C–0011.

17—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $1,381,826. Metal parts for 2.75-inch rockets. Ammunition Procurement and Supply Agency, Joliet, Ill. DA AA09–67–C–0363.

—**Colt's, Inc.**, Hartford, Conn. $15,780,937. M16A1 and M16(5.56mm) rifles. Army Weapons Command, Rock Island, Ill. DA AF03–68–C–0061.

—**Whirlpool Corp.**, Evansville, Ind. $1,040,918. 90mm projectiles, XM594. Picatinny Arsenal, Dover, N.J. DA AA21–68–C–0759.

—**Sharpe and Hamaker, Inc.**, Arlington, Va. $1,286,682. Construction of a Night Vision Simulator Laboratory at Fort Belvoir, Va. Engineer District, Norfolk, Va. DA CA65–68–C–0174.

18—**Del E. Webb Corp.**, Los Angeles, Calif. $10,917,100. Construction of 10 enlisted men's barracks and support facilities at Fort Ord, Calif. Engineer District, Sacramento, Calif. DA CA05–68–C–0092.

—**Canon Construction Co.**, Beverly Hills, Calif. $2,711,300. Construction of 150 family housing units. Presidio of San Francisco, Calif. Engineer District, Sacramento, Calif. DA CA05–68–C–0090.

—**Honeywell, Inc.**, Hopkins, Minn. $1,182,726. Facilities to increase the production capacity for grenade fuzes at the Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement and Supply Agency, Joliet, Ill. DA 11022–ORD–2895.

—**Burroughs Corp.**, Paoli, Pa. $1,237,489. Automatic message processing system equipment. Electronics Command. Ft. Monmouth, N.J. DA 28043–AMC–02238(E).

19—**Chrysler Corp.**, Highland Park, Mich. $1,026,100. 175mm high explosive projectiles. Gateway Army Ammunition Plant, St. Louis, Mo. Ammunition Procurement and Supply Agency, Joliet, Ill. DA AA09–68–C–0006.

—**Universal Industries, Inc.**, Chicago, Ill. $2,678,500. AN/TCC–50 terminal telephones. Electronics Command, Philadelphia, Pa. DA AB05–68–C–0642.

—**Concrete Pavers, Inc.**, Tampa, Fla. $1,311,171. Construction of taxiway and runway access Numbers 1 and 2, and operational apron addition at Pope AFB-Fort Bragg, N.C. Engineer District, Savannah, Ga. DA CA21–68–C–0083.

—**Southern Airways of Texas, Inc.**, Fort Wolters, Tex. $28,270,000. Helicopter pilot training and maintenance of aircraft and related equipment. Purchasing and Contracting Office, Fort Wolters, Tex. DA BD13–68–C–0069.

—**Hawthorne Aviation**, Fort Rucker, Ala. $2,567,591. Aircraft maintenance services on fixed and rotary wing aircraft and related test support. Cairns Army Airfield. Fort Rucker, Ala. Aberdeen Proving Grounds, Md. DA 18001–AMC–1122(R).

—**Ford Motor Co.**, Highland Park, Mich. $5,477,937 1¼-ton utility trucks. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06–68–C–0001.

20—**Aberthaw Construction Co.**, Washington, D.C. $3,545,000. Construction of a combined Federal Regional Center and National Civil Defense Computer Center for the Office of Civil Defense Region 2. Olney, Md. Engineer Dist., Baltimore, Md. DA CA31–68–C–0113.

—**Western Electric Co.**, New York, N.Y. $1,337,950. Testing of Sentinel missile components. $13,768,200. Additional research and development for the Sentinel missile defense system. Work will be done by the Bell Telephone Labs., Whippany, N. J. ($4,931,150); Raytheon Co., Wayland, Mass. ($3,500,000); IBM Corp., Cranford, N.J. ($3,300,000): Douglas McDonnell Corp., Santa Monica, Calif. ($3,000,000): Lockheed Electronics Corp., Los Angeles ($250,000); and Martin Co., Orlando, Fla. ($125,000). Sentinel System Command, Redstone Arsenal, Ala. DA 30–069–AMC–00333(Y).

—**General Motors**, Indianapolis, Ind. $2,647,700. XTG–411–2A transmission components for M109, 155mm-howitzers. Tank Automotive Command, Warren, Mich. DA AE07–68–C–0836.

—**Thiokol Chemical Corp.**, Woodbine, Ga. $1,190,016. Chemical agent, CS2. Edgewood Arsenal, Edgewood, Md. DA AA15–68–C–0677.

—**Brunswick Corp.**, Sugar Grove, Va. $1,521,450. Chemictlly filled (CS–2) 35mm cartridges. Edgewood Arsenal, Edgewood, Md. DA 18035–66–AMC–0962.

—**A. O. Smith Corp.**, Chicago, Ill. $4,194,641. Metal parts for 750-lb. bombs. Bellmead, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0078.

—**Lear Siegler, Inc.**, Anaheim, Calif. $2,995,449. M125A1 metal parts for fuzes, M557. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0376.

—**Chamberlain Mfg. Corp.**, Elmhurst, Ill. $3,666,915. Metal parts for 105mm smoke projectiles. Waterloo, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0489.

—**Craig Systems Corp.**, Lawrence, Mass. $1,299,$58. Shelters for electrical equipment. Electronics Command, Philadelphia, Pa. DA AB05–67–C–2786.

—**DeKalb Commercial Body Corp.**, DeKalb, Ill. $2,261,178. Shelters for electrical equipment. Electronics Command, Philadelphia, Pa. DA AB05–68–C–1726.

21—**Markwell and Hartz, Inc.**, Memphis, Tenn. $2,519,060. Work on the Caddo Dam (replacement) Propject. Caddo Parrish, La. Engineer Dist., New Orleans, La. DA CW29–68–C–0219.

—**Mine Safety Appliances Co.**, Pittsburgh, Pa. $1,342,522. Multi-year procurement for M17A–1 field protective masks. Esmond, R.I. Edgewood Arsenal, Edgewood, Md. DA AA15–67–C–0265.

—**Cutler-Hammer, Inc.**, Deer Park, N.Y. $1,011,500. AN/PPS–4 radar sets and related items. Electronics Command. Fort Monmouth, N.J. DA 28–043–AMC–02158E.

—**General Electric**, Syracuse, N.Y. $3,757,041. AN/MPQ–4 Radar sets. Electronics Command, Philadelphia, Pa. DA AB05–67–C–2341.

—**Westinghouse Electric Corp.**, Baltimore, Md. $2,794,735. Redesigning and modifying AN/TPS–27 radars to AN/TPS–48 configuration. White Sands Missile Range, N.M. DA AD07–68–C–0278.

—**Fairchild Camera and Instrument Corp.**, Syosett, N.Y. $3,145,680. M514A1E1 artillery proximity fuzes. Copiague, N.Y. Harry Diamond Labs., Washington, D.C. DA AG39–67–C–0086.

—**Raytheon Co.**, Bristol, Tenn. $3,066,120. M514A1E1 artillery proximity fuzes. Harry Diamond Labs., Washington, D.C. DA AG39–67–C–0087.

—**Greenfield Construction Co., Inc.**, Livonia, Mich. $2,585,120. Work on the Saginaw River-Flint River, Michigan Flood Control Project. Flint, Mich. Engineer Dist., Detroit, Mich. DA CW35–68–C–0089.

—**Bowen-McLaughlin-York Co.**, York, Pa. $4,031,816. Retrofit of M48A1 tanks to the M48A3 configuration. Army Weapons Command, Rock Island, Ill. DA AF03–67–C–0076.

—**Missouri Research Labs, Inc.**, St. Charles, Mo. $1,101,936. 195-patient ward containers—a service element component of self-contained, transportable medical units (MUST). Mobility Equipment Command, St. Louis, Mo. DA AK01–68–C–8162.

—**Hercules Engines, Inc.**, Canton, Ohio. $5,417,847. LD465–1 multi fuel engines assemblies for 2½-ton trucks. Tank Automotive Command, Warren, Mich. DA AE06–68–C–0006.

—**Continental Motors Corp.**, Mobile, Ala. $1,400,000. Remanufacture of government-furnished AVDS 1790–28 engine assemblies with metal containers. Brookley AFB, Ala. Tank Automotive Command, Warren, Mich. DA AE07–68–C–1166

—**General Motors Corp.**, Detroit, Mich. $1,948,362. 8V71T diesel engines for M109 vehicles, Tank Automotive Command, Warren, Mich. DA AE07–68–C–2554.

—**North Electric Co.**, Galion, Ohio. $4,115,840. Tactical Automatic Switching System (SATSS) for Seventh Army. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0376.

—**Talley Industries, Inc.**, Mesa, Ariz. $2,534,625. Colored smoke canisters. Edgewood Arsenal, Edgewood, Md. DA AA15–68–C–0741.

—**Columbus Milpar Mfg. Co.**, Columbus, Ohio. $1,145,500. Fin assemblies for 2.75-inch rockets. Picatinny Arsenal, Dover, N.J. DA AA21–67–C–0425.

—**Bell Helicopter Co.**, Fort Worth, Tex. $1,151,600. Improved attitude indicating systems for AH–1G helicopters. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–C–0469.

—**Barber-Greene Co.**, Aurora, Ill. $1,286,585. Five asphalt mixing plants. Mobility Equipment Command, St. Louis, Mo. DA AK01–67–C–0773.

—The Army Aviation Materiel Command, St. Louis, Mo., has awarded the following five contracts to **AVCO Corp.**, Stratford, Conn.:

$5,042,869. Special test equipment and special tooling to increase production capability for T53L13 turbine engines. DA AJ01–68–C–1993.

$3,281,625. Preproduction effort to increase production capability for T53L13 engines. Charleston, S.C. DA AJ01–68–C–1876.

$9,000,000. Expansion of production facilities for T53L13 turbine. Charleston, S.C. DA AJ01–68–C–1767.

$1,855,400. Repair of production facilities for T53L13 engines. DA AJ01–68–C–1767.

$46,157,550. T53L13 engines for Huey Cobra helicopters. Stratford, Conn., Charleston, S.C. DA AJ01–68–C–1874.

—**John Wood Co.**, St. Paul, Minn. $2,275,552. Fin assemblies (M131A1) for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0484.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $2,304,726. M131A1 fin assemblies for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0485.

—**Poloron Products, Inc.**, New Rochelle, N.Y. $1,491,000. M131A1 fin assemblies for 750-Lb. bombs. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0486.

24—**Western Electric**, New York, N.Y. $7,430,000. Overhaul of Nike Hercules systems. Burlington, N.C. Army Missile Command, Huntsville, Ala. DA AH01–67–A–0037.

—**Brunswick Corp.**, Sugar Grove, Va. $4,058,200. Chemical filled canisters. Edgewood Arsenal, Edgewood, Md. DA AA15–68–C–0755.

—**Franchi Construction Co.**, Newton, Mass. $3,177,500. Rehabilitaiton of six existing buildings to provide laboratory and administration facilities for the Army Materiel Research Agency. Watertown Arsenal, Watertown, Mass. New England Div., Corps of Engineers, Waltham, Mass. DA CA33–68–C–0040.

—**Colt's, Inc.**, Hartford, Conn. $2,969,325. 5.56mm rifles. Army Weapons Command, Rock Island, Ill. DA AF03–68–C–0061.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $2,593,998. Construction of six 200-man dormitories. MacDill AFB, Fla. Engineer Dist., Jacksonville, Fla. DA CA17–68–C–0053.

—**Ryan Aeronautical Co.**, San Diego, Calif. $2,121,717. Line items of repair parts in support of the MQM–34D Target Missile Flight Services Program. Army Missile Command, Huntsville, Ala. DA 04–495–AMC–1105 Z).

—**Continental Aviation & Engineering Corp.**, Toledo, Ohio. $1,580,832. Line items for repair parts in support of the MQM–34D Target Missile Flight Services Program. Army Missile Command, Huntsville, Ala. DA AH01–68–A–0047.

—**Motorola, Inc.**, Scottsdale, Ariz. $1,433,300. Radar data receiver and transmitting sets. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0304.

—**AiResearch Mfg. Co.**, Phoenix, Ariz. $1,226,700. Gas turbine engines and containers for MUST. Mobility Equipment Command, St. Louis, Mo. DA 23–195–AMC–00082.

—**Amelco, Inc., and Diz y Guardia**, Panama City, Panama. $1,052,695. Construction of a 32-unit BOQ and for alterations to dormitories at Howard AFB, Canal Zone. Engineer Dist., Jacksonville, Fla. DA CA17–68–C–0051.

—**General Dynamics**, Rochester, N.Y. $1,033,593. Radio teletypewriter sets. Electronics Command, Philadelphia, Pa. DA AB05–68–C–0035.

25—**Studebaker Corp.**, Minneapolis, Minn. $7,524,394. Generator sets. Mobility Equipment Command, St. Louis, Mo. DA AK01–68–C–8051.

—**Boeing Co.**, Morton, Pa. $6,574,148. CH–47 Chinook helicopter spare parts. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A005.

—**Lockheed Electronics Co.**, Plainfield, N.J. $3,672,000. Radar equipment used in the fire control system of the 20mm anti-aircraft gun. Metuchen, N.J. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–0718.

—**Curtis Wright Corp.**, East Paterson, N.J. $3,152,642. Tactical imagery interpretation equipment. Electronics Command, Philadelphia, Pa. DA AB05–68–C–1233.

—**Craft Construction Co.**, Stockton, Calif. $3,064,517. Construction of a flammable storage warehouse and for an addition to an existing warehouse at Sharpe General Depot, Stockton, Calif. Engineer Dist., Sacramento, Calif. DA CA05–68–C–0104.

—**R. G. LeTorneau**, Longview, Tex. $1,938,240. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0030.

—**Norris Industries**, Los Angeles, Calif. $1,395,966. 2.75-inch rocket motor tubes. Pico Rivera, Calif. Picatinny Arsenal, Dover, N.J. DA AA21–67–C–0416.

—**John C. Cornell, Inc.**, Clovis, N.M. $1,172,671. Construction of three dormitories. Cannon AFB, N.M. Engineer Dist. Albuquerque, N.M. DA CA47–68–C–0088.

26—**Western Electric**, New York, N.Y. $1,496,600. Research and development for extended range of the Sprint Missile. Orlando, Fla. Sentinel System Command, Redstone Arsenal, Ala. DA 30–069–AMC–00333 (Y).

—**Thiokol Chemical Corp.**, Huntsville, Ala. $1,268,429. Development of Sprint composite propellant. Sentinel System Command, Redstone Arsenal, Ala. DA HC60–68–C–0043.

—**Philco Ford Corp.**, Palo Alto, Calif. $1,145,000. Satellite communications terminal at Kwajalein Missile Range. Sentinel System Command, Redstone Arsenal, Ala. DA HC60–68–C–0040.

—**Thompson Co. and Stearns-Roger Corp.**, St. Charles, Mo. $20,656,114. Non-toxic defoliant. Edgewood Arsenal, Md. DA AA15–68–C–0691.

—**General Time Corp.**, Rolling Meadows, Ill. $4,491,298. 105mm artillery round fuzes. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–0730.

—**Boeing Co.**, Morton, Pa. $4,366,242. Transmission assemblies for CH–47 helicopters. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A–0005.

—**S. J. Groves & Co.**, Ann Arbor, Mich. $4,354,316. Construction of a dam and appurtenant works. Union City, Pa. Engineer Dist., Pittsburgh, Pa. DA CW59–68–C–0139.

—**Bunker-Ramo Corp.**, Canoga Park, Calif. $3,099,999. A universal automatic map compilation system. Army Map Service, Washington, D.C. DA CA71–68–C–0134.

—**General Motors**, Indianapolis, Ind. $2,609,460. Breech mechanism assemblies for 152mm gun/launchers. Watervliet Arsenal, N.Y. DA AF07–68–C–0181.

—**National Union Electric Corp.**, Bloomington, Ill. $1,989,240. Nose fuzes for 750-lb. bombs. Army Procurement Agency, Chicago, Ill. DA AA09–68–C–0386.

—**Kanarr Corp.**, Kingston, Pa. $1,967,787. 40mm grenade launchers. Army Weapons Command, Rock Island, Ill. DA 11–199–AMC–00715 (W).

—**Raytheon Co.**, Andover, Mass. $1,712,400. Refurbishing and overhauling various major items of Hawk missile system. Fort Bliss, Tex. Army Missile Command, Huntsville, Ala. DA AH01–68–A–0037.

—**Raytheon Co.**, Andover, Mass. $1,504,537. FY 1968 depot calibration publications and for a capability for self-propelled high-powered illuminators. Army Missile Command, Huntsville, Ala. DA AH01–68–C–0706.

—**ARF Products**, Raton, N.M. $1,597,422. Radio sets. Electronics Command, Philadelphia, Pa. DA AB05–68–C–0038.

—**K.D.I. Precision Products**, Cincinnati, Ohio. $1,477,965. Fuze safety and arming devices for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0339.

—**Circle, Inc.**, Belle Chasse, La. $1,465,119. Construction of hurricane protection works. New Orleans, La. Engineer Dist., New Orleans, La. DA CW29–68–C–0242.

—**General Electric**, Burlington, Vt. $1,340,136. 20mm automatic aircraft guns, gun pods and ancillary equipment. Burlington, Vt. and Springfield, Mass. Army Weapons Command, Rock Island, Ill. DA AF03–67–C–0057.

—**Kentron, Hawaii, Ltd.**, Honolulu, Hawaii. $1,259,846. Specialized augmenting services to support maintenance of calibration standards and test equipment in general electronics micro wave and other measurements supporting the U.S. Army in the Pacific. Contracting Division, U.S. Army Hawaii. DA 94–600–PAC–05639.

—**Gencarelli, Inc.**, Westerly, R.I. $1,145,128. Construction of a breakwater and causeway at Plymouth Harbor, Mass. New England Corps of Enginers, Waltham, Mass. DA CW33–68–C–0140.

27—**Western Electric**, New York, N.Y. $1,117,200. Nike Hercules improved kits. Burlington, N.C. Army Missile Command, Huntsville, Ala. DA AH01–67–A–0028.

—**Vitro Corp.**, Fort Walton Beach, Fla. $1,200,000. Vehicle acquisition and tracking system. Dugway Proving Ground, Utah. DA AD09–68–C–0090.

—**V&N Construction Co.**, Lubbock, Tex. $2,844,819. Construction of an academic building at Fort Sill, Okla. Engineer Dist., Albuquerque, N.M. DA CA47–68–C–0106.

—**Aerojet General**, Sacramento, Calif. $1,463,200. Hawk rocket motors. Nimbus, Calif. Army Procurement Agency, Oakland, Calif. DA AG05–67–C–1009.

—**FMC Corp.**, San Jose, Calif. $1,849,450. Production engineering in support of the M113A1 full-tracked self-propelled vehicle. Army Procurement Agency, Oakland, Calif. DA 04–200–AMC–02929.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,437,347. Direction finder sets and various components for installation in aircraft. Electronics Command, Fort Monmouth, N.J. DA AB05–68–A–0304.

—**ITT Gilfillan, Inc.**, Los Angeles, Calif. $2,207,945. Parts qualification test program, reliability program, and spare parts for the directional mortar locating radar set AN/TTQ–28. Electronics Command, Fort Monmouth, N.J. DA AB07–67–C–0146.

—**Christie Electric Corp.**, Los Angeles, Calif. $2,072,520. Power supplies. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0434.

—**Electrospace Corp.**, Glen Cove, N.Y. $1,669,260. Various searchlights and ancillary items. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0370.

—**Southern Airways Co.**, Sylacauga, Ala. $4,725,000. Metal parts for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0277.

—**Emerson Electric**, St. Louis, Mo. $4,465,000. XM28 helicopter armament subsystems. Army Weapons Command, Rock Island, Ill. DA AF03–68–C–0025.

—**Maremont Corp.**, Saco, Maine. $1,538,089. M60 machine guns with spare barrels and bipod assemblies. Army Weapons Command, Rock Island, Ill. DA AF03–67–C–0087.

—**Mack Truck, Inc.**, Allentown, Pa. $1,472,493. Vehicle repair parts. Tank Automotive Command, Warren, Mich. DA AF07–68–C–0872.

—**Mack Truck, Inc.**, Allentown, Pa. $1,943,298. Engine assemblies for 5-ton trucks. Hagerstown, Md. Tank Automotive Command, Warren, Mich. DA AE07–68–C–3224.

—**Hercules Engines, Inc.**, Canton, Ohio. $1,163,053. Repair parts for 14-horsepower standard military engines. Mobility Equipment Command, St. Louis, Mo. DA AK01–68–C–8141.

—**Metric Systems Corp.**, Fort Walton Beach, Fla. $1,110,030. Trestle assemblies for floating and fixed bridges. Mobility Equipment Command, St. Louis, Mo. DA AK01–68–C–8366.

—**Irving T. Miller & Co.**, Burgetts Town, Pa. $2,383,453. Work on the Chartiers Creek local protection project. Near Pittsburgh, Pa. Engineer Dist., Pittsburgh, Pa. DA CW59–68–C–0140.

—**International Harvester**, San Diego, Calif. $2,812,007. CH–47 helicopter auxiliary power units. Aviation Materiel Command, St. Louis, Mo. DA 23–204–AMC–03921.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,398,936. UH–1 helicopter quill assemblies; DA AJ01–68–A–0022; $2,667,398. UH–1 helicopter rotary wing blades. DA AJ01–68–A–0022; $2,070,985. UH–1 helicopter scissors and sleeves. DA AJ01–68–A–0022. Aviation Materiel Command, St. Louis, Mo.

—**Bendix Corp.**, Teterboro, N.J. $1,899,693. Type MB–1 attitude indicators supporting multiple type aircraft. Aviation Materiel Command, St. Louis, Mo. DA AJ01–67–D–0106.

—**Boeing Co.**, Morton, Pa. $6,082,435. CH–47 helicopter spare parts. DA AJ01–68–A–0005; $8,300,215. CH–47 helicopter spare parts. DA AJ01–68–A–0005. Aviation Materiel Command, St. Louis, Mo.

—**Physics International Co.**, San Leandro, Calif. $2,493,012. Design development of the aurora transient radiation effects facility. Defense Atomic Support Agency. DA SA01–68–C–0175.

—**Avco Corp.**, Stratford, Conn. $5,042,869. Special test equipment and special tooling to increase production capability for T53L13 turbine engines. DA AJ01–68–C–1993; $3,281,625. Pre-production effort to increase production capability for T53L13 engines. DA AJ01–68–C–1876; $9,000,000. Expansion of production facilities for T53L13 turbine engines. DA AJ01–68–C–1767; $1,855,400. Repair of production facilities for T53L13 engines. DA AJ01–68–C–1767; $46,157,550. T53L13 engines for Huey Cobra helicopters. DA AJ01–68–C–1874. Aviation Materiel Command, St. Louis, Mo.

28—**Montgomery, Ross & Fisher**, Los Angeles, Calif. $13,158,000. Construction of an eight-story reinforced concrete hospital. Fort Ord, Calif. Engineer Dist., Sacramento, Calif. DA CA05–68–C–0111.

—**Magnavox Co.**, Urbana, Ill. $1,639,078. M18 gun direction computers. Army Procurement Agency, Chicago, Ill. DA AA25–68–C–0429.

—**Robers Dredge, Inc.**, LaCrosse, Wis. $1,069,834. Flood protection work along the Mississippi River near Canton, Mo. Engineer Dist., Rock Island, Ill. DA CW25–68–C–0057.

—**V&N Construction Co.**, Lubbock, Tex. $1,047,320. Construction of an academic building with a fallout shelter at Fort Wolters, Tex. Engineer Dist., Fort Worth, Tex. DA CA63–68–C–0173.

—**Guyler Co.**, Lampasas, Tex. $1,376,951. Construction of a personnel processing facility with air conditioning at Lackland AFB, Tex. Engineer Dist., Fort Worth, Tex. DA CA63–68–C–0176.

—**General Electric**, Burlington, Vt $2,305,069. Spare parts for the Vulcan XM–163 weapons system. DA AG25–68–C–0866; $2,317,780. 20mm air defense artillery guns. DA AG25–68–C–0751. Army Procurement Agency, New York, N.Y.

—**Great Lakes Dredge & Dock Co.**, New York, N.Y. $3,941,090. Construction of a hurricane flood protection project near Keansburg, N.J. Engineer Dist., New York, N.Y. DA CW51–68–C–0045.

—**Babcock Electronics Corp.**, Costa Mesa, Calif. $3,490,000. Personnel target subsystem installation and testing. Army Procurement Agency, Oakland, Calif. DA AG05–68–C–0762.

—**Dynalectron**, Washington, D.C. $1,150,000. Job data collection and related support service for operation of the White Sands Missile Range, N.M. White Sands Missile Range, N.M. DA 29–040–AMC–1505(R).

—**Stewart Pacific, Inc.**, Seattle, Wash. $1,988,974. Construction of a small boat harbor on the Kona Coast of Hawaii. Engineer Dist., Honolulu, Hawaii. DA CW83–68–C–0016.

—The Ammunition Procurement & Supply Agency, Joliet, Ill., has awarded the following 23 contracts:

Firestone Tire & Rubber Co., Akron, Ohio. $7,520,470. Loading, assembling and packing ammunition and related components, and for operation of the Army Ammunition Plant, Ravenna, Ohio. DA 11–173–AMC–00065(A).

Chamberlain Mfg. Corp., Elmhurst, Ill. $2,647,512. Production of 105mm cartridge cases. Burlington, N.J. DA AA09–68–C–0305.

Mason & Hanger-Silas Mason Corp., Lexington, Ky. $12,017,249. Production of bombs, mines, support services and operation of the Army Ammunition Plant, Grand Island, Neb. DA 11–173–AMC–00019(A).

Olin Mathieson Chemical Corp., New York, N.Y. $8,263,865. Production of propelling charges. Charleston. Ind DA 11–173–AMC–00097(A); $1,770,400. Production of propellants and for support activities at the Army Ammunition Plant, Baraboo, Wis. DA 11–173–AMC–00106(A).

Federal Cartridge Corp., Minneapolis, Minn. $20,471,361. Production of small arms ammunition and support services at the Army Ammunition Plant, New Brighton, Minn. DA 36–038–AMC–01099(A).

Hercules, Inc., Wilmington, Del. $11,367,055. Manufacture of propellants and support services at the Army Ammunition Plant, Radford, Va. DA W–11–173–AMC–00037(A); $14,095,014. Production of propellants, mixed acids and support services at the Army Ammunition Plant, Lawrence, Kan. DA 11–173–AMC–42A.

Atlas Chemical Industries, Wilmington, Del. $3,031,915. Production of TNT and support services at the Army Ammunition Plant, Chattanooga, Tenn. DA 11–173–AMC–00531(A).

Sperry Rand Corp., New York, N.Y. $25,953,751. Metal parts for projectiles: loading, assembling and packing ammunition and components; and support services at the Army Ammunition Plant, Shreveport, La. DA 11–173–AMC–00080(A).

Hamilton Watch Co., Lancaster, Pa. $2,887,500. Fuzes for 105mm illuminating shells. East Petersburg, Pa. DA AA09–68–C–0503.

McGraw Edison Corp., Ingraham Industries Div., Bristol, Conn. $3,856,140. 105mm and 4.2-inch projectile fuzes. DA AA09–68–C–02224.

Remington Arms Co., Bridgeport, Conn. $25,315,569. Small arms ammunition and support services at the Army Ammunition Plant, Independence, Mo. DA 49–010–AMC–00003(A).

General Time Corp., Stamford, Conn. $1,472,000. M565 mechanical time fuzes for 105mm and 4.2-inch illuminating shells. LaSalle, Ill. DA AA09–68–C–0223; $3,400,186. M564 fuzes for 105mm and 4.2-inch mortar shells. Thomaston, Conn. DA AA09–68–C–0229.

General Motors, Detroit, Mich. $15. 737,245. Metal parts for 105mm projectiles. St. Louis, Mo. DA AA09–68–C-0066; $14,503,636. Modernization and support activities for production of metal parts for 105mm projectiles. St. Louis, Mo. DA AA09–67–C–0025.

Norris Industries, Los Angeles, Calif. $3,573,321. Metal parts for 81mm and 105mm cartridge cases. Riverbank, Calif. DA AA09–68–C–0394.

Columbus Milpar Mfg. Co., Columbus, Ohio. $1,240,000. Metal parts for 81mm projectile fuzes. Columbus and Westerville, Ohio. DA AA09–68–C–0300.

Rulon Co., Chicago, Ill. $2,070,000. Metal parts for M48A3 fuzes. DA AA09–68–C–0296.

Thiokol Chemical Corp., Bristol, Pa. $35,151,301. Production and loading, assembling and packing mortars, rocket motors, igniters, and other miscellaneous ammunition. Marshall, Tex. DA 11–173–AMC–00200(A).

Holston Defense Corp., Kingsport, Tenn. $1,215,227. Production of miscellaneous explosives and support activities at the Army Ammuniiton Plant, Kingsport, Tenn. DA W–11–173–AMC–00035(A).

Uniroyal, Inc., New York, N.Y. $31,279, 322. Production of explosives and for loading, assembling and packing of supplemental charges. Joliet, Ill. DA 11–173–AMC–00062(A).

—**Wilkinson Mfg. Co.**, Fort Calhoun, Neb. $1,205,375. Metal parts for M524A5 fuzes. Army Procurement Agency, New York, N.Y. DA AA09–68–C–0308.

—**Diamond, Inc.**, Great Neck, N.Y. $1,800,023. Construction of an incinerator for the New York Harbor. Caven Point Terminal, N.J. Engineer Dist., New York, N.Y. DA CW51–68–C–0046.

—**Hamilton Watch Co.**, Lancaster, Pa. $1,647,709. 105mm artillery fuzes. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–0431.

—**Amron Corp.**, Waukesha, Wis. $2,325,608. 20mm brass cartridge cases. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–0360.

—**Emco Porcelain Enamel Co.**, Port Chester, N.Y. $1,122,550. M2A1 metal ammunition boxes. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–8731.

—**White Motor Corp.**, Lansing, Mich. $2,882,939. 2½-ton trucks. General Purpose Vehicles Project Manager, Warren, Mich. DA AE07–67–C–5819.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $1,595,986. Technical data package for M715 vehicles. DA AE06–68–C–0013; $40,857,294. Five-ton trucks. South Bend, Ind. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06–68–C–0012.

—**Mack Trucks**, Allentown, Pa. $9,272,448. 198 diesel engines and one lot of concurrent repair parts. Hagerstown, Md. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06–68–C–0010.

—**Union Carbide Corp.**, New York, N.Y. $3,262,500. Batteries for radio sets (AN/PRC 8, 9 and 10). Charlotte, N.C. Electronics Command, Philadelphia, Pa. DA AB05–68–C–2471.

—**RCA**, Burlington, Mass. $4,624,974. Two depot-installed Maintenance Automatic Test Equipment (DIMATE) and ancillary items. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0405.

—**Cutler-Hammer, Inc.**, Deer Park, N.Y. $10,374,890. AN/PPS-5 radar sets and ancillary items. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0432.

—**Hallicrafters Co.**, Rolling Meadows, Ill. $2,440,000. Ground support equipment for countermeasure sets (AN/ALQ–80 (XEN)). Electronics Command, Fort Monmouth, N.J. DA AB07–67–C–0262.

—**Harvard Industries**, Farmingdale, N.Y. $1,160,334. Radio sets (AN/GRC–50). Electronics Command, Fort Monmouth, N.J. DA AB05–68–C–0016.

—**Honeywell, Inc.**, St. Petersburg, Fla. $1,000,000 Classified R&D. Electronics Command, Fort Monmouth, N.J.

—**Northrop Nortronics Corp.**, Palo Verdes, Calif. $5,487,544. AN/ASH–19 voice communications system and associated items for selected aircraft. Electronics Command, Fort Monmouth, N.J. DA AB06–68–C–0467.

—**Resdel Engineer Corp.**, Pasadena, Calif. $1,174,909. Classified electronic equipment. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0427.

—**Raytheon Co.**, Norwood, Mass. $4,615,000. Multiplexers and ancillary items. North Dighton, Mass. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0332.

—**H. B. Zachry Co.**, San Antonio, Tex. $2,585,066. Work on the Fort Worth Floodway Project. Tarrant and Fort Worth Counties, Tex. Engineer Dist., Fort Worth, Tex. DA CW63–68–C–0146.

—**Warrior Constructors**, Houston, Tex. $1,000,500. Construction of three BOQ buildings at Randolph AFB, Tex. Engineer Dist., Fort Worth, Tex. DA CA63–68–C–0172.

—**Darragh & Lyda, Inc.**, San Antonio, Tex. $1,085,037. Construction of two service clubs at Lackland AFB, Tex. Engineer Dist., Fort Worth, Tex. DA CA63–68–C–0163.

—**Youngdale Construction Co.**, San Diego, Calif. $1,402,282. Construction of an NCO Open Mess, an Officers Open Mess and an Exchange Sales Store at Tinker AFB, Okla. Engineer Dist., Fort Worth, Tex. DA CA63–68–C–0165.

—**Avco Corp.**, Stratford, Conn. $1,434,000. Six aircraft engine test stands. Charleston, S.C. Aviation Materiel Command, St. Louis, Mo. AF–41–608–67–A–3234.

—**Boeing Co.**, Morton, Pa. $2,926,819. Transmission assemblies and spare parts for CH–47 helicopters. DA AJ01–68–A–0005; $26,579,318. CH–47 helicopters. DA AJ01–68–C–0577. Aviation Materiel Command, St. Louis, Mo.

—**Bell Helicopter Co.**, Fort Worth, Tex. $3,340,326. UH–1 rotary wing hubs. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A–0022.

—**Clevite Corp.**, Freeport, Ill. $1,427,230. BA–279/U dry batteries. Electronics Command, Philadelphia, Pa. DA AB05–68–C–2472.

—The Tank Automotive Command, Warren, Mich., has awarded the 16 following contracts:

Kaiser Jeep Corp., Toledo, Ohio. $3,533,154. Utility trucks. DA AE07–67–C–3236.

Hercules Engines, Inc., Canton, Ohio. $9,069,498. Engine assembly installation for 2½-ton trucks. DA AE07–68–C–3131; $1,051,540. Engine assembly installation for five-ton trucks. DA AE07–68–C–2234.

Miller Trailers, Inc., West Bradenton, Fla. $1,275,000. Six-ton semi-trailer vans. DA AE07–68–C–3009.

Ford Motors, Wixon, Mich. $1,150,000. Production engineering services for ¼-ton utility trucks and front line ambulance trucks. DA AE07–68–C–2998.

General Motors, Anderson, Ind. $1,305,945. Storage batteries for use on tactical vehicles. Anaheim, Calif. DA AE07–68–C–3225.

General Motors, Indianapolis, Ind. $1,231,920. Transmission assemblies with containers for M60A1 tanks. DA AE07–68–C–2806.

General Motors, Detroit, Mich. $1,000,000. Advanced production engineering for the XM–70 Main Battle Tank. Warren, Mich. and Cleveland, Ohio. DA AE07–68–C–3097; $1,562,892. Diesel engines for the M113 vehicle. DA AE07–68–C–0410.

Caterpillar Tractor Co., Peoria, Ill. $1,773,500. Advanced production engineering for the VHO family of engines. DA AE07–68–C–2997.

International Harvester Co., Chicago, Ill. $2,977,918. Air transportable maintenance trucks. St. Louis, Mo. DA AE07–68–C–3246.

Chrysler Corp., Centerline, Mich. $1,373,000. Advanced production engineering for XM746 truck tractors. DA AE07–68–C–2974.

FMC Corp., South Charleston, W. Va. $5,585,233. M113 vehicles. DA AE07–68–C–0446; $2,306,200. M113A1 vehicles. DA AE07–68–C–0446.

FMC Corp., San Jose, Calif. $11,500,000. M113A1 vehicles. DA AE07–68–C–2340.

Continental Motors, Muskegon, Mich. $5,336,929. Engine assemblies for M48A31/M60A1 tanks. DA AE07–68–C–2734.

—The Army Weapons Command, Rock Island, Ill., has awarded the following six contracts:

Hughes Tool Co., Culver City, Calif. $1,577,241. XM27E1 armament subsystems for the OH–6A helicopter. DA AF03–68–C–0075.

Colt's, Inc., Hartford, Conn. $1,175,868. 5.56mm magazine assemblies to support the M16 family of weapons. DA AF03–68–C–0080.

General Motors, Cleveland, Ohio. $1,359,864. 155mm howtizers. DA 11–199–AMC–000610(W).

General Electric, Burlington, Vt. $4,147,822. XM18E1 aircraft armament pods, 7.62mm aircraft machine guns, and ancillary equipment. Burlington, Vt. and Springfield, Mass. DA AF03–68–C–0078.

General Electric, Springfield, Mass. $1,576,920. M73E1 machine guns, final inspection and test equipment, and concurrent repair parts. DA AF03–67–C–0086; $2,032,635. M85 machine guns, inspection and test equipment, barrel assemblies, and bolt assemblies. DA AF03–67–C–0039.

—**Flinchbaugh Products**, Red Lion, Pa. $1,072,620. Metal parts for 152mm projectiles. Picatinny Arsenal, Dover, N.J. DA AA21–68–C–1110.

—**TRW, Inc.**, Washington, D.C. $1,000,000. Integrated technical data systems for the AH–56A helicopter. Harry Diamond Laboratories, Washington, D.C. DA 490186–AMC–00324(X).

—The Army Missile Command, Huntsville, Ala., has awarded the following eight contracts:

McDonnell Douglas Corp., Titusville, Fla. $5,500,000. Production engineering and production of Dragon antitank weapon system. DA AH01–68–C–0282.

RCA, Burlington, Mass. $7,376,835. Five sets of LCSS (land combat support set) and engineering support for production and for technical publications. DA AH01–68–C–2041.

Hughes Aircraft, Culver City, Calif. $2,700,000. TOW industrial engineering services. DA AH01–68–C–2155.

Honeywell, Inc., Hopkins, Minn. $2,829,583. Shillelagh guidance set components. DA AH01–68–C–2092.

Alsco, Inc., Dayton, Ohio. $1,592,757. 2.75-inch rocket launchers. DA AH01–68–C–2130.

Ryan Aeronautical Co., San Diego, Calif. $3,528,555. Maintenance and flight operations services for the MQM–34D Firebee Target Missile Drone. Dana Ana and McGregor Ranges, N.M. DA AH01–68–C–0003.

Raytheon Co., Andover, Mass. $1,177,330. Maintenance and modification of special tooling and test equipment for the Hawk missile system. DA AH01–68–C–0702.

McDonnell Douglas Corp., Santa Monica, Calif. $6,500,000. Research & development. RA–AH01–68–C–1237.

—**Robert E. McKee Construction Co.**, El Paso, Tex. $5,103,200. Construction of five barracks and two mess halls at Fort Carson, Colo. Engineer Dist., Omaha, Neb. DA CA45–68—C–0081.

—**North American Rockwell Co.**, Anaheim, Calif. $1,400,000. Army Materiel Command technical data configuration management system. Frankford Arsenal, Philadelphia, Pa. DA 36–038–AMC–03168(A).

—**Day & Zimmerman, Inc.**, Philadelphia, Pa. $3,312,969. Loading, assembling and packing miscellaneous ammunition, components and support services at the Army Ammunition Plant, Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–00114(A).

—The Mobility Equipment Command, St. Louis, Mo., has awarded the following five contracts:

Continental Motors, Muskegon, Mich. $4,881,833. Three and six horsepower standard military gas engines. DA 23–195–AMC–00808(T).

Caterpillar Tractor Co., Peoria, Ill. $1,555,012. 75 diesel engine driven tractors. DA AK01–68–C–8147; $1,043,285. 35 Tractors. DA AK01–67–C–1364.

Garrett Corp., Belmar, N.J. $2,210,000. 100 expandable shelters. DA AK01–68–C–4237.

Zero Mfg. Co., Los Angeles, Calif. $1,847,900. 50 expandable shelters. Burbank, Calif. DA AK01–68–C–4236.

—**Texas Instrument Corp.**, Dallas, Tex. $1,896,766. HYL–3 and –4 TSEC regenerative repeaters (tactical) and U383/VR power supply adapters. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0357.

—**Timmons, Butt & Head, Inc.**, Dayton, Ohio. $10,374,097. Construction of an avionics science laboratory at Wright-Patterson AFB, Ohio. Engineer Dist., Louisivlle, Ky. DA–CA27–68–C–0057.

DEPARTMENT OF THE NAVY

3—**DeLaval Turbine Inc.**, Trenton, N.J. $10,769,956. Nuclear submarine propulsion machinery, including turbines, gears, generators, motors and condensers. Naval Ship Systems Command. N00024–68–C–5410.

—**Dyson & Co.**, Pensacola, Fla. $2,366,420. Construction of BOQ at Naval Air Station, Pensacola, Fla., and a BOQ addition at Naval Auxiliary Air Station, Saufley Field, Pensacola, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Philco-Ford Corp.**, Palo Alto, Calif. $1,819,331. Operation and maintenance of test sites for data acquisition and data reduction at the DOD joint parachute test facility. El Centro, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–68–C–1091.

—**Edgington Oil Refinery**, Long Beach, Calif. $1,563,678. Asphalt petroleum. Navy Purchasing Office, Los Angeles, Calif. N00123–68–D–2276.

—**Akwa-Downey Construction**, Milwaukee, Wis. $1,469,740. Construction of barracks at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C. NBy-84088.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $1,400,000. A–6A modernization study. Naval Air Systems Command. N00019–68–C–0058.

—**General Signal Corp.**, Woodbury, N.Y. $1,152,377. Radar equipment. Naval air Systems Command. N00019–68–C–0288.

—**Hughes Aircraft**, Culver City, Calif. $1,002,378. Aircraft launchers. Naval Air Systems Command. N00019–68–C–0160.

4—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $19,230,300. Modification kits for the E–2A program. Naval Air Systems Command. N00019–67–C–0657.

—**Hughes Aircraft**, Culver City, Calif. $8,923,000. Phoenix missile system (increased limitation of authorization). Tucson, Ariz. and Culver City. Naval Air Systems Command. N00019–68–C–0295.

—**Boeing Co.**, Morton, Pa. $2,470,957. CH–46D helicopters. Naval Air Systems Command. N00019–67–C–0255.

—**Raytheon Co.**, Lowell, Mass. $1,213,627. Guidance and control groups for Chaparral missiles for the Army. Naval Air Systems Command. N00019–68–C–0323.

—**Simplex Wire & Cable Co.**, Portsmouth, N.H. $1,760,000. 488 nautical miles of submarine cable. Naval Electronic Systems Command. N00039–68–C–3609.

—**ITT Corp.**, Nutley, N.J. $1,699,440. Manufacture of AN/URN–20 TACAN beacons. Naval Electronic Systems Command. N00039–C–2558.

5—**Western Electric**, New York, N.Y. $5,324,175. Classified work. Whippany, N.J. Naval Electronic Systems Command. N00039–68–C–3584.

—**Hazeltine Corp.**, Little Neck, N.Y. $6,105,736. Airborne interrogator sets. Naval Air Systems Command. N00019–67–C–0656.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $3,219,967. Construction of recruit barracks at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62473–67–C–3077.

—**Philco-Ford Corp.**, Willow Grove, Pa. $1,241,820. Ten militarized card punches. Naval Ship Systems Command. N00024–68–C–1249.

—**Lasko Metal Products**, West Chester, Pa. $1,023,006. Zuni Rocket launchers. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5373.

6—**McDonnell Douglas Corp.**, St. Louis, Mo. $248,130,000. F–4E aircraft. Naval Air Systems Command. N00019–68–C–0495.

—**United Aircraft**, Hartford, Conn. $25,373,990. J–52 P–8A engines. Naval Air Systems Command. N00019–67–C–0182.

—**Westinghouse Electric**, Baltimore, Md. $2,145,000. Rigid antennae for AN/TPS–22A radar sets. Marine Corps Headquarters.

7—**Whittaker Corp.**, Columbus, Ohio. $10,135,377. MK 15, MOD 1, bomb fins. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5398.

—**RCA**, Van Nuys, Calif. $8,053,647. Classified electronic countermeasure systems, repair parts, engineering services, and training and technical data. Naval Ship Systems Command. N00024–68–C–1302.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $5,908,972. Airborne communication, navigation and identification systems and related equipment. Naval Air Systems Command. N00019–67–C–0658.

—**Magnavox Co.**, Fort Wayne, Ind. $1,263,040. Classified electronic countermeasure equipment. Naval Air Systems Command. N00019–68–C–0280.

—**CWC Associates**, Uniondale, N.Y. $1,130,000. Rehabilitation of barracks at the Naval Construction Battalion Center, Davisville, R.I. Northeast Div., Naval Facilities Engineering Command, Boston, Mass. NBy–83548.

10—**Christenson Raber Kief & Associates, and B–E–C–K Constructors**, Seattle, Wash. $4,364,700. Construction of family housing units at the Naval Air Station, Whidbey Island, Oak Harbor, Wash. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash. NBy–84879.

—**Corbetta Construction Co.**, Des Plaines, Ill. $3,997,000. Construction of 200 housing units at the Naval Training Center, Great Lakes, Ill. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill. NBy-83704.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $3,187,560. MK 41, MOD 0, projectiles for 5"/54-cal. ammunition. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5406.

—**United Aircraft**, Stratford, Conn. $1,980000. Design, development and construction of a prototype assault support patrol boat. Naval Ship Systems Command. N00024–68–C–0349.

11—**Volpe Construction Co.**, Washington, D.C. $5,987,000. Construction of a chemistry laboratory at the Naval Research Laboratory, Washington, D.C. Chesapeake Div., Naval Facilities Engieering Command, Washington, D.C. NBy–66288.

—**Intercontinental Mfg. Co.**, Garland, Tex. $1,969,716. MK 84, MOD 2, bomb bodies for 2,000-pound bombs. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–67–C–0074 MOD P024.

—**ITT Corp.**, Nutley, N.J. $1,774,558. Manufacture of AN/GRN–9D equipment. Naval Electronic Systems Command. N00039–68–C–2563.

—**Timmons, Butt & Head, Inc.**, Columbus, Ohio. $1,762,342. Construction of an addition to the instrument overhaul shop at the Newark Air Force Station, Ohio. East Central Div., Naval Facilities Engineering Command, Philadelphia, Pa. NBy-89322.

—**Perini Corp.**, Boston, Mass. $1,291,290. Extension of pier one at the Newport, R.I., Naval Station. Northeast Div., Naval Facilities Engineering Command, Boston, Mass. NBy-83565.

—**Shadrick & Wood, Inc.**, Farmville, Va. $1,008,338. Rehabilitation of the BOQ at the Norfolk, Va., Naval Air Station. Atlantic Div., Naval Facilities Engineering Command. Norfolk, Va. NBy-88272.

12—**Defoe Shipbuilding Co.**, Bay City, Mich. $16,258,814. Twenty-two LCUs. Naval Ship Systems Command. N00024–68–C–0336.

—**Clevite Corp.**, Cleveland, Ohio. $7,450,000. Engineering studies to develop MK 48, MOD 1, torpedoes, and fabrication and testing of prototype models. Naval Ordnance Systems Command. N00017–67–C–1206.

—**Cardwell Mfg. Co.**, Wichita, Kan. $4,637,799. Sixteen minesweeping systems, including cranes, power supplies, remote control systems, winches and cable reels. Naval Ship Systems Command. N00024–68–C–5405.

—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $3,935,685. Project Bumblebee R&D. Naval Ordnance Systems Command. NOw 62–0604C.

—**Scripps Institution of Oceanography**, La Jolla, Calif. $3,338,556. Oceanographic research. Office of Naval Research.

—**Sundstrand Corp.,** Rockford, Ill. $1,335,591. Constant speed drives and quick attach-detach kits and associated spares for installation in A–7 aircraft. Naval Air Systems Command. N00019–68–C–0088.

—**Stromberg-Carlson Corp.,** San Diego, Calif. $3,742,708. Tactical display systems. Naval Air Systems Command. N00019–68–C–0253.

—**J. B. Denny Jr.,** Norfolk, Va. $1,499,040. Construction of an electronic accessories overhaul building at the Naval Air Station, Norfolk, Va. Naval Facilities Engineering Command. NBy–88512.

—**FTS Corp.,** Denver, Colo. $1,259,135. Wings for Sidewinder missiles. Naval Ordnance Station, Indian Head, Md. N00174–68–C–0632.

—**ESB, Inc.,** Raleigh, N.C. $1,003,228. $1,054,890. Production of MK 46, MOD 1 and MK 53, MOD 0, batteries. Naval Ordnance Systems Command. N00017–68–C–1431 and N00017–68–C–1432.

13—**Associated Aero Science, Inc.,** Torrance, Calif. $3,493,575. Processing, analyzing, and evaluating technical data for the Naval Weapons Center, China Lake, Calif. Ridgecrest, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–68–C–1223.

—**United Aircraft,** Stratford, Conn. $1,100,000. HH–3F helicopters for the Coast Guard. Naval Air Systems Command. N00019–67–C–0141.

14—**Bunker-Ramo Corp.,** Silver Spring, Md. $5,011,826. Work on ECM equipment. Naval Air Systems Command. N00019–68–C–0210.

—**General Precision Systems Inc.,** Little Falls, N.J. $2,028,000. Equipment pertaining to the inertial measurement system, a navigational component of A–7E aircraft. Navy Aviation Supply Office, Philadelphia, Pa. N00383–68–A–3201–0015.

—**B. F. Diamond Construction Co., Inc.,** Savannah, Ga. $1,195,150. Extension of Pier 21 at the Naval Station, Norfolk, Va. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va. NBy–88344.

17—**Grumman Aircraft Engineering Corp.,** Bethpage, L.I., N.Y. $8,000,000. EA–6B aircraft. Naval Air Systems Command. N00019–67–C–0078.

—**Dynalectron Corp.,** Washington, D.C. $1,468,754. Collection, processing and reduction of technical data as required by the Pacific Missile Range, Point Mugu, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–68–C–0573.

—**United Aircraft Corp.,** E. Hartford, Conn. $1,058,851. Hand tools for maintenance of TF—30 engines used in F–111 aircraft. Navy Aviation Supply Office, Philadelphia, Pa. N00383–68–69000A–AF372.

—**Meadow Gold Dairies,** Honolulu, Hawaii. $1,060,191. Dairy products. Naval Supply Center, Pearl Harbor, Hawaii. N00604–68–C–0543.

18—**United States Steel Corp.,** Pittsburgh, Pa. $15,471,000. Mark 82, MOD 1, bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5408.

—**IBM Corp.,** Washington, D.C. $1,052,601. Form DD1348, a single line item requisition document. Navy Purchasing Office, Washington, D.C. Greencastle, Ind., and Sherman, Tex. N00600–68–D–1477.

—**Dorne and Margolin, Inc.,** Bohemia, N.Y. $1,098,831. 1,619 VHF Log Periodic Antennae (AS–2236/GRC). Headquarters, Marine Corps.

19—**Grumman Aircraft Engineering Corp.,** Bethpage, L.I., N.Y. $11,919,000. Development of the E–2A/APS–111 weapon system. Naval Air Systems Command. N00019–68–C–0542.

—**McLean Contracting Co., Inc.,** Baltimore, Md. $2,997,000. Extension of wharf Alpha at the Naval Weapons Station, Charleston, S.C. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C. NBy–70993.

—**Grumman Aircraft Engineering Corp.,** Bethpage, L.I., N.Y. $2,749,816. Evaluation of the functional feasibility of a multi-sensor detection and attack system in an R&D flight test vehcile. Naval Air Systems Command. N00019–68–C–0055.

—**Teledyne Corp.,** Berwick, La. $1,441,688. Design, development and construction of prototype assault support patrol boat (ASPB). Naval Ship Systems Command. N00024–68–C–0350.

—**B&G Constructors, Inc.,** Santa Ana, Calif. $1,222,701. Construction of aircraft maintenance shops at the Marine Corps Air Station, El Toro, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62473–67–C–3155.

—**William E. Arnold Co.,** Jacksonville, Fla. $1,928,000. Rehabilitation of barracks at the Naval Air Station, Jacksonville, Fla. Southeast Div. Naval Facilities Engineering Command, Charleston, S.C. NBy–86103.

20—**Ball Brothers Research Corp.,** Boulder, Colo. $1,150,000. Design and development of an Apollo telescope mount and associated equipment. Office of Naval Research.

—**Thomas W. Yoder Co., Inc.,** Rockville, Md. $1,111,111. Construction of an addition to the Intelligence Center, Naval Scientific and Technical Center, Suitland, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C. NBy–84651.

21—**Western Electric Co.,** New York, N.Y. $3,386,808. Oceanographic research material. Naval Electronic Systems Command N00039–68–C–3608.

—**North American Rockwell Corp.,** Anaheim, Calif. $1,277,754. Design, development, and fabrication of two acoustic source antennae for the Navy's Acoustic Communication Program. Columbus, Ohio, and Los Angeles, Calif. Navy Purchasing Office, Brooklyn, N.Y. N00140–68–C–0549.

—**Grumman Aircraft Engineering Corp.,** Bethpage, N.Y. $1,148,101. Implementation of a study to develop the most effective complement of maintenance equipment for support of attack aircraft aboard aircraft carriers. Naval Air Engineering Center, Philadelphia, Pa. N00156–68–C–2318.

24—**Lockheed Missiles & Space Co.,** Sunnyvale, Calif. $5,000,000. Test support in the development of the Sentinel system. Special Projects Office. N00030–68–C–0303.

—**Harrison Overseas Corp.,** Miami, Fla. $4,273,000. Construction of barracks at the Naval Station, and at the Naval Air Station, Guantanamo Bay, Cuba. Caribbean Div., Naval Facilities Engineering Command, San Juan, Puerto Rico. NBy-84202.

—**Interstate Electronics Corp.,** Anaheim, Calif. $3,541,542. Poseidon missile test instrumentation. Special Projects Office. N00030–66–C–0207.

—**AAI Corp.,** Cockeysville, Md. $2,568,685. Automatic testing equipment system for testing aircraft engines. Naval Supply Center, Norfolk, Va. N00189–68–C–0838.

—**Kauai Builders Ltd.,** Lihue, Kauai, Hawaii. $1,860,534. Construction of communication facilities and additions to the operations control building, missile assembly facility, radar maintenance shops, and telemetry facility at the Pacific Fleet Tactical Range, Barking Sands, Kauai, Hawaii. Pacific Div., Naval Facilities Engineering Command, Honolulu, Hawaii.

—**Western Gear Corp.,** Lynwood, Calif. $1,597,800. Diesel engine driven propelling units used for propelling pontoons. Navy Purchasing Office, Los Angeles, Calif. N00123–68–C–1897.

25—**Admiral Corp.,** Chicago, Ill. $3,925,505. Radio sets for aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–68–C–3380.

—**Youngdale Construction Co.,** San Diego, Calif. $1,847,000. Construction of barracks and a mess hall at the Naval Submarine Support Facility, Ballast Point, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62463–67–C–3030.

—**Uniflite, Inc.,** Bellingham, Wash. $1,365,165. Motor whaleboats (26 foot). Naval Ship Systems Command. N00024–68–C–0339.

—**Sanders Associates,** Nashua, N.H. $1,160,000. Design, development and fabrication of an airborne sensor operator display system and airborne tactical coordinator display system for carrier-based anti-submarine warfare aircraft, and supporting items. Navy Air Development Center, Johnsville, Pa. N62269–68–C–0475.

—**Ingalls Shipbuilding Corp.,** Pascagoula, Miss. $107,416,500. Construction of three nuclear-powered attack submarines. Naval Ship Systems Command. N00024–68–C–0242.

—**General Dynamics,** Groton, Conn. $107,416,500. Construction of three nuclear powered attack submarines. Naval Ship Systems Command. N00024–68–C–0243.

26—**Johns Hopkins University Applied Physics Laboratory,** Silver Spring, Md. $4,822,400. Continued research and development in connection with various missiles. Naval Ordnance Systems Command. NOw–62–0604c.

—**Perlin Co.,** Newport News, Va. $2,265,079. Construction of barracks at the Naval Station, Norfolk, Va. Atlantic Div., Naval Faclities Engineering Command, Norfolk, Va. NBy-93375.

—**Condec Corp.,** Old Greenwich, Conn. $1,628,511. Missile cradles for Sparrow and Shrike missiles. Niskayuna, N.Y. Naval Ordnance Laboratory, White Oak, Md. N60921–68–C–0390.

27—**Sanders Associates,** Nashua, N.H. $12,000,000. Electronic equipment. Naval Air Systems Command. NOw(A)66–0356.

—**Magnavox Co.,** Fort Wayne, Ind. $2,533,701. Sonobuoys and related equipment. Naval Air Systems Command. N00019–68–C–0591.

—**Raytheon Co.,** South Lowell, Mass. $1,075,248. Guidance and control groups for Chapparral missiles for the Army. Naval Air Systems Command. N00019–68–C–0102.

—**American Machine & Foundry Corp.,** York, Pa., $14,852,736. 500-lb. bomb bodies Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–67–C–0715.

—**Lockheed Missile & Space Co.,** Sunnyvale, Calif. $12,592,743. Polaris field engineering support. Special Projects Office. N00030–69–C–0033.

—**Westinghouse Electric,** Washingeon, D.C. $11,852,500. Poseidon launcher equipment. Sunnydale, Calif. Special Projects Office. N00030–68–C–0218.

—**Westinghouse Electric,** Baltimore, Md. $3,250,000. APD–7 side-looking radar systems for use on RA5C aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–98500A–AA.

—**General Dynamics,** San Diego, Calif. $1,300,000. Radar sub-system for the AN/ASB–12 bomb navigational system. Aviation Supply Office, Philadelphia, Pa. N000383–68–C–3385.

—**John C. Grimberg Co., and Seal & Co.,** Rockville, Md. $1,672,000. Rehabilitation and extension of utilities at the Naval Academy, Annapolis, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C. NBy–75588.

—**Symmetrics Engineering Corp.,** Satellite Beach, Fla. $1,275,000. Telemetry antenna systems for the Pacific Missile Range, Point Mugu, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–68–C–1333.

—**Oberg Construction Corp.,** Northbridge, Calif. $1,146,000. Construction of an aircraft parking apron at the USMC Air Station, El Toro, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62473–67–C–3814.

28—**R. F. Communications, Inc.,** Rochester, N.Y. $1,854,612. Manufacture of AN/VRT–23 radio transmitters. Naval Electronic Systems Command. N00039–68–C–1584.

—**United Aircraft,** Stratford, Conn. $1,499,997. Modification of the CH–53 dynamics system to provide a capability to retrieve H–53 helicopters and other tactical aircraft. Naval Air Systems Command. N00019–68–C–0602.

—**North American Rockwell Corp.,** Anaheim, Calif. $1,635,000. Components of the AN/ASB12 bomb navigational system for RA5C aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–67–A–5502–0279.

—**Lusardi Construction Co.,** Vista, Calif. $1,827,000. Construction of a combat vehicle maintenance shop and battalion tactical maintenance shops at Camp Pendleton, Calif. Naval Facilities Engineering Command. N62473–67–C–3083.

—**Merando, Inc.,** Washington, D.C. $2,477,400. Construction of barracks at the Naval Air Test Center, Patuxent River, Md. Chesapeake Div., Naval Facilities Engineering Command, Washtington, D.C. NBy-94635.

—**Lansdowne Steel & Iron Co.,** Morton, Pa. $8,162,000. 5-inch 38-Caliber gun projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5481.

—**American Mfg. Co.,** Fort Worth, Tex. $3,439,437. 5-inch, 54-caliber gun projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5482.

—**Norris Industries,** Los Angeles, Calif. $2,402,253. Steel cartridge cases for 5-inch, 38-caliber and 54-caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–5469.

—**Jones Construction Co.,** Memphis, Tenn. 03,870,000. Construction of barracks at the Naval Air Station, Memphis, Tenn. Southwest Div., Naval Facilities Engineering Command, Charleston, S.C. NBy-88769.

—**Contel Construction Corp.,** San Francisco, Calif. $2,972,000. Construction of barracks at the Naval School Command, Naval Station, Treasure Island, San Francisco, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif. NBy-85440.

—**Honeywell , Inc.,** West Covina, Calif. $2,300,462. ASW training device 14A2H, with data and support. Naval Training Device Center, Orlando, Fla. N61339–68–C–0306.

—**Applied Devices Corp.,** College Point, N.Y. $1,966,614. Carrier control approach radar, repair parts, engineering services, a training course, and technical documentation. Naval Ship Systems Command. N00024–68–C–1354.

—**Security Construction Co.,** Richmond, Va. $1,577,000. Rehabilitation of Sampson Hall at the Naval Academy, Annapolis, Md. Naval Facilities Engineering Command. NBy-84572.

—**Goodyear Tire & Rubber Co.,** Akron, Ohio. $1,359,827. Twenty-five tactical airfield fuel dispensing systems. Marine Corps Headquarters. M00027–68–C–0221.

DEPARTMENT OF THE AIR FORCE

3—**Philco Ford Corp.,** Philadelphia, Pa. $1,269,360. Repair and test of airborne missile guidance systems. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–68–D–0302.

—**ITEK Corp.,** Palo Alto, Calif. $4,565,860. Production of radar warning and homing equipment. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F04606–67–A–1818.

4—**General Electric,** West Lynn, Mass. $6,858,046. J–85 aircraft engines. F33657–67–C–1659–P004. $19,986,600. Production of helicopter engines. F33657–67–C–1428–P002. Aeronautical Systems Div., (AFSC) Wright Patterson AFB, Ohio.

5—**Hallicrafters,** Chicago, Ill. $1,490,459. Airborne transmitter components. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F34601–68–A–2915.

—**RCA,** Burlington, Mass. $1,209,375. Airborne electronics camera R&D. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615–68–C–1617.

—**Aerodex, Inc.,** Miami, Fla. $2,644,839. Overhaul of reciprocating aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608–68–D–0616–0014.

—**Fiarchild Hiller Corp.,** Germantown, Md. $2,318,628. Production of aerospace ground equipment in support of C–119 aircraft. St. Augustine, Fla. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–68–C–6133 POOD 0002.

6—**Applied Technology, Inc.,** Palo Alto, Calif. $2,000,000. Production of radar receiving sets. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1302.

7—**TRW, Inc.,** Redondo Beach, Calif. $2448,000. Development work on the Minuteman operational targeting, tape validation and verification program. Norton AFB, Calif. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–68–C–0170.

—**Raytheon Co.,** Bedford, Mass. $1,075,000. Development work on a radar guidance system. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615–68–C–1586.

12—**Litton Systems,** Woodland Hills, Calif. $1,062,125. Repair of components of the inertial navigation system applicable to F–4 aircraft. F04606–68–A–1047, $4,455,887. Production of spare parts to support a stellar inertial navigation system applicable to RC–135 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F04606–68–A–1047.

—**Sperry Rand Corp.,** Salt Lake City, Utah. $2,095,999. Production of airborne and ground radar systems. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F34600–68–A–2263.

13—**General Electric,** Utica, N.Y. $1,918,547. Production of radar space parts. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F9603–68–C–2632.

—**Ryan Aeronautical Co.,** San Diego, Calif. $1,020,200 Maintenance and operation of the drone control facility at Tyndall AFB, Fla. Tyndall AFB, Fla. F08637–68–C–0178.

14—**Philco-Ford Corp.,** Palo Alto, Calif. $1,499,046. Work on a satellite control facility. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04801–68–C–0209.

—**Sante Fe Engineers,** Lancaster, Calif. $1,896,000. Construction of a re-entry system assembly surveillance and inspection building and associated munitions handling and storage for Minuteman Wing III at Malmstrom AFB, Mont. Corps of Engineers, Ballistic Missile Construction Office. DACA 13–68–C–6004.

17—**Lockheed Aircraft Corp.,** Marietta, Ga. $3,860,000. Engineering, design and fabrication of center wing sections for C–130 aircraft. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F09603–68–C–2530.

18—**General Electric Co.,** West Lynn, Mass. $7,872,000. T–64 turboshaft engines for HH–53 helicopters. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0458–P003.

—**Radiation Inc.,** Melbourne, Fla. $1,000,000. Engineering and production of an airborne communications electronics system. Palm Bay, Fla. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. F19628–68–C–0392.

19—**Goodyear Aerospace Corp.,** Akron, Ohio. $2,490,000. Design, fabrication and test of development models of an electro-optical area correlation terminal guidance system. Aeronautical Systems Div. (AFSC), Wright-Patterson AFB, Ohio. F33615–68–C–1626.

—**North American Rockwell Corp.,** Columbus, Ohio. $1,000,000. Development of the laser optical guidance integration concept. Aeronautical Systems Div. AFSC), Wright-Patterson AFB, Ohio. F33615–67–C–1859,

—**Litton Systems, Inc.,** Woodland Hills, Calif. $4,298,400. Development of an airborne navigational system. Air Force Missile Development Center, Holloman AFB, N.M. F29600–68–C–0026.

20—**Thiokol Chemical Corp.,** Huntsville, Ala. $1,500,000. Production of solid fuel rocket motors. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–68–C–0120.

—**Hughes Aircraft Co.,** Culver City, Calif. $3,301,000. Production of components for AN/ALQ71 airborne countermeasure system. El Segundo, Calif. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F33615–68–C–1676.

—**McDonnell Douglas Corp.,** Long Beach, Calif. $1,065,699. Production of components for aircraft bomb racks. Torrance, Calif. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga. F04606–67–A–1432.

—**Sanders Associates, Inc.,** Nashua, N.H. $1,154,131. Manufacture of airborne countermeasure receiver subsystems (AN/ARD–18). Aeronautical Systems, Div, (AFSC), Wright-Patterson AFB, Ohio F33657–68–C–0079.

21—**Boeing Co.,** Renton, Wash. $1,650,000. Aircraft technical data. Oklahoma Air Materiel Area, (AFLC), Tinker AFB, Okla. F04606–67–A–0519–TA60.

24—**Lear Siegler, Inc.,** Santa Monica, Calif. $3,759,776. Flight control systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0031.

—**General Electric,** West Lynn, Mass. $24,730,158. Production of helicopter engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–67–C–1428.

—**Olin Mathieson Chemical Corp.,** East Alton, Ill. $3,048,000. Production of engine starter cartridges for B–57 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1058.

—**Hughes Aircraft,** Fullerton, Calif. $1,063,331. Spare parts for prototype tactical air control operations centers. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F19628–67—C—0154.

25—**Cessna Aircraft,** Wichita, Kan. $1,219,000. Engineering and modification services, spare parts and data for O–2A aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1224.

26—**Boeing Co.,** Wichita, Kan. $2,300,000. Modification kits for B–52 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–68–C–4271.

—**McDonnell Douglas Corp.,** Santa Monica, Calif. $1,909,190. Preparation of space boosters for launch site operations. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–68–C–0136.

27—**Centex Construction Co.,** Dallas, Tex. $6,720,000. Construction of family housing units at Laredo AFB, Tex. Base Procurement Office, Laredo AFB, Tex. F4161–68–I–0429.

—**Carnegie-Mellon University,** Pittsburgh, Pa. $1,866,631. Research in electronic data processing equipment information processing. Air Force Office of Scientific Research, Washington, D.C. F44620–67–C–0058.

28—**Fairchild Hiller Corp.,** Crestview, Fla. $1,212,180. Repair of major F–105 aircraft components, Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F09603–68–C–0188.

—**Dynamics Corp. of America,** Bridgeport, Conn. $2,132,223. Production of MB–teen electrical generators, Pasco, Wash. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–68–D–0575.

—**I.B.M. Corp.,** Gaithersburg, Md. $3,900,000. Work on a large aperture seismic array experimental signal processing system. Washington, D.C. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. F1962867–C–0198.

—**Borders Electronics Co.,** Medford, N.J. $2,730,175. Production of electronic counter-measure equipment. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–68–C–1786.

—**Texas Instruments, Inc.,** Dallas, Tex. $30,381,750. Development and production of an adverse weather aerial delivery system. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1271.

—**North American Aviation,** Anaheim, Calif. $15,484,100. Production of depot maintenance equipment to support the Minuteman missile system. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. AF04 (694) 587.

—**Reeve Aleutian Airways,** Anchorage, Alaska. $1,005,688. Transportation services. Military Airlift Command. F11626–68–D–0026.

—**Atlantic Research Corp.,** Alexandria, Va. $1,908,589. Meteorological rockets for high altitude weather test programs. Gainesville, Va. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–68–C–3337.

—**Hayes International Corp.,** Birmingham, Ala. $1,299,511. Services in the management and worldwide distribution of Air Force publications. Middle River, Md. 2750th Air Base Wing, Wright-Patterson AFB, Ohio. F33601–67–C–0853.

—**Lockheed Missiles & Space Co.,** Sunnyvale, Calif. $3,500,000. Provision of equipment, supplies and service for space and missile programs. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–68–C–0235.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

UNIVERSITY OF FLORIDA
3 1262 09683 3776

PAID

FLARE

When requesting address change, include current mailing label, above.

Top Rates to Top Men

U.S. Navy Seabees Seek Best Builders

The U. S. Navy is issuing a new call for Seabees under its Direct Procurement Petty Officer Program. The direct procurement program provides an outstanding opportunity for skilled men to fulfill their military obligation while gaining increased experience in their trade.

Qualified volunteer civilian construction workers, regardless of race, creed, or national origin, can join the Seabees with advanced rates. Volunteers sign up at any Navy recruiting office for a Seabee 30-month tour of duty. At that time, they are given direct petty officer ratings, based on their qualifications.

Any man under 40 years of age, who has been a civilian constructionman apprentice for 24 months or has 24 months of experience, can enlist in the Seabees as a Petty Officer 3rd Class. A constructionman with 48 months training and experience (normally a journeyman) can be a Petty Officer 2nd Class. A more senior worker can be a Petty Officer 1st Class, if he has seven years experience including some at the foreman or master level. Workers with still greater experience can be rated as Chief Petty Officers.

The Seabee volunteer goes directly to the Construction Battalion Center at Gulfport, Miss. There he attends a special school studying his responsibilities as a Navy petty officer.

After a month at Gulfport, he is given leave before reporting for duty to one of three Construction Battalion Centers, at Gulfport, Davisville, R. I., or Port Hueneme, Calif. He receives further training and is assigned to a construction battalion. His battalion spends about eight months on a construction job overseas; returns to its home base for six months of further training and outfitting; then, deploys overseas for another eight-month tour of duty.

Seabee specialties are: builder, construction electrician, construction mechanic, equipment operator, engineering aid (surveyor-draftsman), steelworker, and utilities man. A Seabee works in his specialty; he gets 30 days paid leave annually; and his opportunities for promotion are excellent.

Army Constructing New Weapons Research Building

The U. S. Army has begun construction of a research building at Rock Island Arsenal, Ill., that will aid engineers in the development of new weapons.

The building will house the Army's first test device to simulate the motions of an armored vehicle or helicopter, and to measure the forces upon these vehicles as a result of firing weapons from them. The simulator will make possible faster and more economical development of armament for tanks, self-propelled artillery, armored vehicles and helicopters.

Army Weapons Command engineers and researchers will use the simulator to establish the dynamics of a vehicle, and to determine effects of a vehicle's movement through the air or over rough ground on the firing of its weapons. They will seek to discover how factors such as adverse vibrations affect a weapon's accuracy and sighting devices.

When the building is completed in July 1969, research will not be dependent upon weather conditions or upon availablity of vehicles or crews.